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NOVEMBER 1950 **VOL. XLIII—NO. 5**

CONTENTS

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By BILL WINTER

"IN THIS year's Plymouth Internationals, *Freshman* contestants were not required to build their own planes," states Jerry Lindsay, Highland Park, who asks that we say something about the subject. "In free flight the contestant was required only to release the plane."

"There are quite a few modelers in the *Freshman* class who build their own planes," Jerry continues, "and it is unfair to have them compete against planes built by older modelers. Instead of encouraging building, I believe this rule discourages younger contestants."

Jerry, we can't see much sense in the present rule, either. Of course, the tough part is in the flying. Adjustment is an art. Assuming that big brother or pop makes the airplane, do they also adjust it? If the small fry can adjust and fly their own airplanes why not require them to build them as well? Anybody who knows cement when he sees it can put together some of the kits now on the market. Since models are both harder to build and fly as they get bigger, why not limit *Freshman* entrants to ½A free flight? Might even be an idea to limit them to kits, by making it a kit competition open to guys up to so many years of age. But by all means we feel the *Freshman* should make his own model plane just as much as the Soap Boxer makes his own racer.

This guy, Joe Wagner, who presides over free flight design at *Veco*, is a real challenge. When a fellow is wrapped up in theory, you know what to think. The same goes for the guy who claims a "model" has no relationship to a real plane. But when you run into the rare character who combines the practical with theory, well . . . Joe's development of those left-thrusted *Veco* kits is enough to make us pay attention when he gives out. (Incidentally, one of our boys has better than 150 flights on a *Dakota* complete with lights, pencells, and sheeted-in wing bottoms; like the bumble bee, it shouldn't be able to fly.)

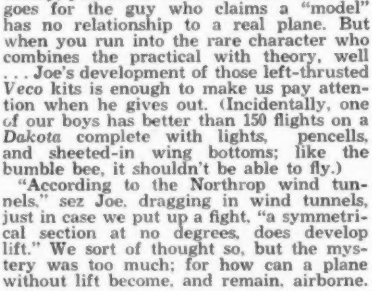
"According to the Northrop wind tunnels," sez Joe, dragging in wind tunnels, just in case we put up a fight, "a symmetrical section at no degrees, does develop lift." We sort of thought so, but the mystery was too much; for how can a plane without lift become, and remain, airborne. Sure it has flippers, but what about level flight?

"It does this by creating a synthetic angle of attack," Joe lays it on the line. "Imagine the airfoil at zero degrees. Having no lift in this condition, the section begins to drop. However, having a forward velocity as well as a downward velocity, the airfoil has placed itself in a relative air flow at a positive angle, whose tangent (paging Charlie Grant) is the vertical velocity divided by the forward velocity. If this angle is less than the stalling angle for the particular section in question, then lift is developed. Since this lift was greater in every case than the weight of the section, it follows that, in practice, the result would be an upward displacement of the wing. This places the airfoil in a negative air flow in the same manner and results in negative lift. This forces the wing down and the cycle repeats itself.

"Now, since the downward velocity in that part of the cycle is governed by the weight of the aircraft, plus the negative lift generated in the previous part of the cycle," Joe rambles on, cutting in the supercharger, "but the upward velocity is affected by the positive lift, minus the weight, it can be seen that the section automatically induces an angle of attack sufficient to support the weight of the aircraft, provided enough thrust is developed to keep the downward angle less than the stalling angle. Actually, a symmetrical wing in level flight flies in a series of oscillations, too slight and rapid to be apparent. We can see that any model with a symmetrical wing, where the wing, stab, and thrust settings are all at zero degrees, will have no climb or dive tendencies, regardless of the amount of thrust, as long as it is enough to fly the plane level." Or who put the chicken in the chicken chow mein? For some reason this reminds us of a barely repressed desire; just when the Indoor event is at its un-natural quietest, to play over the P.A. system, Chinese Mule Train!

Having demonstrated that a symmetrical section lifts but flies level (seriously, however, we think the stunt masters could play with the in-between-the-lines suggestions of Joe W's discussion) let us demon-

(*Turn to page 44*)



Joseph Nieto

Born in Middlesborough, England, in 1910, Joe lived in Cardiff, Wales, during the worst part of World War I, and he clearly remembers the Zeppelin and Gotha air raids. Later lived in France and Spain and came to the U. A. after the Armistice. Graduated from U. S. Army Air Corps Tech. School in 1938 and served until the start of World War II. Began his photo collection with Lindbergh's Paris Flight and now has the most outstanding private "museum" on aviation in America. He has been in Civil Service at Kelly Field for ten years, covering the airplane from Instrument Specialist to Industrial Engineer. Now lives with wife and family in their "museum" home at the "West Point of the Air" in San Antonio. Joe, who is well remembered by his series *"The Albatros Fighters on Parade"* (M. A. N., 1934 to 1936), hopes to develop the first Aviation Museum in Texas, complete with full size warplanes. Some of Joe's flying scale models pictured here include a Fairchild monoplane (left rear) that at one time held the World Record for flying scale endurance.

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Ohlsson AA	.85	—
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Powermist Spitfire	.80	1.45
Ranger Glo	.80	—
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Testors 39	.75	—
Dynaglo	.75	—
Ranger AA	.80	—
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Drone	—	1.00
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Veco 6" to 10" 4", 5", 6", 8" pitch	
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Ohlsson Economy V3 or AA	.30
O.K. Glo-plug (V2 or V3)	.49
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1⅞"—50c, 2¼"	.65
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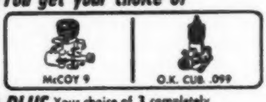

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THEY PLACED THE Bell X-1 in the National Air Museum the other day and we wonder if many among us realize the significance of that event to aviation. The world's first supersonic airplane now a museum piece! Certainly a small event on the world scene boiling with international fires at the moment but certainly also one of the astonishing developments in aviation history. Had any of us told an aircraft designer or USAF officer in World War II that we predicted a supersonic airplane would be a museum piece in 1950 they would have tried to find the daylight through our head. Yet it is now a fact. It means, simply, that the greatest technological hurdle facing aircraft designers over the past 47 years is now not only passed but has been disintegrated! There are now 13 different airplane types capable of flying at supersonic speed and that means that we are now well in to the supersonic age of flight and able to visit the quiet, dusty halls of a museum and look up at the "old" X-1 which did it first!

AND SPEAKING of supersonic aircraft, the Air Force is reversing the whole procedure of things aeronautical and converting a supersonic jet fighter to a propeller-driven airplane! But, believe it or not, the switch will not slow the airplane a bit but will probably make it go even faster. The plane is the McDonnell XF-88 *Voodoo* penetration fighter, recently in competition with two other supersonic airplanes, the Lockheed XF-90 and the Republic F-84F (once called the YF-96A but later returned to its original designation). The Air Force plans to install an Allison T-38 turboprop engine in the nose of the "double eight" swinging a supersonic propeller. The two Westinghouse J34 turbojet engines will stay where they are and the airplane will have a mere 2,750 hp added—about 5,500 lb. of thrust at sonic speed, which just about doubles the present thrust of the airplane. Not a tactical installation (where would all the fuel come from?), the modified XF-88 is being equipped as simply a sonic-speed flying test stand for supersonic propellers. The first installation will be a Curtiss dual-rotation model with a diameter of about 10 ft. Other single-blade (and superior) propellers will follow.

ONE OF THE most remarkable technical developments in recent years is the invention of an airplane refrigerating system that weighs only *twenty pounds!* Surprisingly enough, this new unit was developed by the Hamilton Standard Propeller Division of United Aircraft Corp., the first non-propeller product of the company since the Hamilton H-47 transport airplane of the early 'thirties. Since jet fighter cockpits heat up as much as 75 deg. F. over the outside air, this heat added to the 100 deg. F. of the outside air on a hot summer day, makes the pilot sweat in a 175 deg. F. hot-box that is not only uncomfortable but actually dangerous if prolonged. The new Hamilton unit takes in air at 620 deg. F. and reduces it down as low as 30 deg. F. (just below freezing) by routing it through a tiny turbine wheel only, 3 in. in diameter turning at 60,000 revolutions per minute! If this mystifies you, recall, for a moment, that when a turbine is used to pump air, the air is heated up in the process. It follows, of course, that if the process is reversed and the air is used to drive the turbine, the air is cooled in the process, and that's the principle of this tiny but terrifically powerful new unit. North American is using it as standard equipment in their new F-86D (formerly YF-95A, but recently redesignated) jet fighter and others will follow.

THERE ARE TWO ways to make a projectile—such as a rocket—go straight: (1) Use tail fins, and (2) Give it a terrific spin—like a rifle does—on its way out of the barrel. Aircraft rockets using conventional fins haven't been too successful since they oscillate about their c.g. in flight and this sets up forces that harm their accuracy. But spin-stabilized rockets have been a terrific design problem. Now the Navy thinks they have the answer. A Douglas AD *Skyraider* has been experimentally rigged up with virtually a rocket machine-gun mounted entirely within each wing. The rockets are belt fed to the firing position and are fired through a tube containing rifling (helical grooves) that imparts a spin to them as they leave the muzzle (exactly as a rifle bullet). The test *Skyraider* has a capacity of 19 rockets in each launcher or 38 5-in. rockets in all. These can be fired as fast as three per

(*Turn to page 60*)

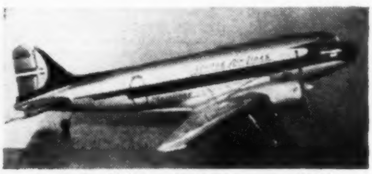
REPORT FROM THE WEST

by Jim Saftig

THE weary westerners have been checking in at regular intervals, with another of the mighty fine Plymouth Internationals under their belts. All hands agree that the Plymouth Corporation did its usual grand job, and, win or lose, contestants from out west are tired but very contented. The coast boys didn't take the "lion's" share of wins, but still managed to carry home quite a bit of the hardware. Dick Rigney, ace speed pilot, was plagued with rough luck. It seems that he had a bit of takeoff trouble and couldn't get his usual spectacular speeds clocked-in. We might add that Dick won the beauty event at the Team Speed classic.

We'll give you a rundown of the western winners at this big meet. *Free Flight—1/2 A Sr.—10.* Charles Hallum; *A Freshman—1.* Richard Allen; 3. Courtney Pond. *Jr.—2.* Bob Turner; *Sr.—7.* Bill Poesch. *B Jr.—2.* Les Bartlett; 9. John Brodbeck. *C Jr.—1.* Jack Hudspeth; 6. Les Bartlett; 9. Bob Turner. *Sr.—6.* Charles Hallum; 8. Larry Goodale. *Outdoor Rubber Stick Jr.—3.* Les Bartlett. *Outdoor Glider Freshman—2.* Richard Allen. *Jr.—3.* Jack Ritner. *Outdoor Rubber Cabin Sr.—7.* Bill Poesch; 9. Charles Hallum. *Indoor Cabin Sr.—5.* Donald Hollfelder; 6. Bill Poesch; 7. Charles Hallum. *Indoor Stick Freshman—1.* Courtney Pond; 3. Richard Allen; *Jr.—5.* Darrell Larks. *Sr.—8.* Charles Hallum; 9. Bill Poesch. *Control Line Stunt Sr.—2.* Duane Varner. *Class B Speed Jr.—2.* John Brodbeck. *Sr.—5.* Larry Goodale. *Jet Speed Jr.—1.* Henry LaVon.

Larry Goodale had a run of bad luck with his free-flight jobs. He had a good flight on his B ship and managed to lose it on the first flight. The following day, his first flight in C was 1/2 sec. over on the engine run and a twenty-seven min. flight was the result.



Douglas Airliner built from modified Cleveland kit by Y. Azeuedo and R. Souza

On returning to the field, he put it in the air again with a short 11 sec. engine run and turned in over ten min., but the ship dropped into a small pond when it landed. After a quick "dry out" and with water still dripping, he put it into the air for the third official; the climb was fine, but it seems that the water warped something or other and the ship spun in on the glide. *Rough!*

Genial Tom Engleman showed the Southern California contestants the town when the train pulled into Chicago on a stopover. They're still talking about the swell dinner and the size of the check. The programs and recreation activities that were made possible by the Plymouth Corporation in Detroit were "tops," as always.

The train ride back from the Internationals was getting a bit long for the western contestants, so Johnny Brodbeck, the "B" of *K & B Torpedo* engines, decided to hold an "anything that is small and flies" contest in one of the empty baggage cars on the train. Everyone was in there trying to win one of the prizes that Johnny put up. First place winners received an .049 engine, 2nd place an .035, and 3rd place winners won the little .020. The ceiling was a bit low, but high time was a rip snorting flight of 9 seconds. From the number of entries and amount of enthusiasm, one would think it was a regular International indoor meet. Whatta place for a fly-powered glider!

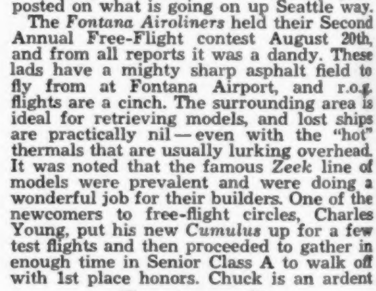
The *Bakersfield Gas Model Airplane Association* held another of its free-flight meets August 13, and a few mouths dropped open when our good friend Carl Goldberg showed up. Seems Carl is a bit of a camera bug, and he spent most of his time taking moving pictures. We're all glad Carl could make the visit. Andy "Campstool" Peterson tried to put his ship through one of the cars at the field and eliminated himself from further competition. That middle name of "Campstool" fits Andy very well. It seems Andy likes his comfort and always carries a small folding campstool with him to the free-flight meets. You know how it is when you have to stand in line or bend over to crank your engine. Guess Andy is getting a bit gray! Francis Stewart CD'd the meet. First place winners as follows: *1/2A*—Elmer Ackterberg; *A*—John Werts, Jr.; *B*—Floyd Prince; *C*—John Werts Sr.

Merv Becker turns club trophy over to R. J. Van Lannen after Airliner win

We received a very nice letter from Carl Stokes, former Long Beach modeler. Carl is up in Alaska (part of the West Coast) aboard the survey ship *Explorer*. One of Carl's friends, Jim Amis of Seattle, keeps him posted on the modeling activities in his section of the state. Stokes sent us a picture of another of his friends, Dave Lefebure, with his PAA-Load ship. Dave goes in for cabin jobs and builds them for each engine class. Seems that this lad takes real pride in his work—his ships are well made and turn in consistently excellent flights. Carl has built one of Chuck Wood's Wakefield jobs and plans to get down to Southern California in the near future for some rubber flying. We expect Carl will keep us posted on what is going on up Seattle way.

The *Fontana Airoliners* held their Second Annual Free-Flight contest August 20th, and from all reports it was a dandy. These lads have a mighty sharp asphalt field to fly from at Fontana Airport, and r.o.g. flights are a cinch. The surrounding area is ideal for retrieving models, and lost ships are practically nil—even with the "hot" thermals that are usually lurking overhead. It was noted that the famous *Zeek* line of models were prevalent and were doing a wonderful job for their builders. One of the newcomers to free-flight circles, Charles Young, put his new *Cumulus* up for a few test flights and then proceeded to gather in enough time in Senior Class A to walk off with 1st place honors. Chuck is an ardent

(*Turn to page 42*)



Denny Davis checks parachute dethermalizer on his A Job of the "San De" series

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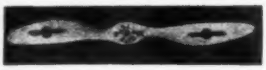

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☐ 8"— 10	☐ 10"— 12	☐ 13"— 6
☐ 8"— 12	☐ 11"— 6	☐ 13"— 8
☐ 9"— 6	☐ 11"— 8	☐ 13"— 10
☐ 9"— 8	☐ 11"— 10	☐ 13"— 12
☐ 9"— 10	☐ 11"— 12	☐ 14"— 6
☐ 9"— 12	☐ 12"— 6	☐ 14"— 8
☐ 10"— 6	☐ 12"— 8	☐ 14"— 10
		☐ 14"— 12

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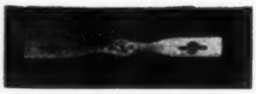

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☐ 10"— 6	☐ 12"— 8	

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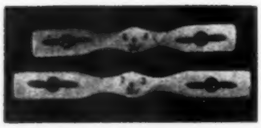

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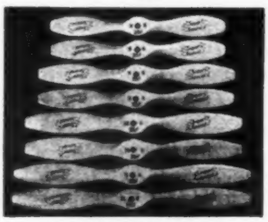

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☐ 8"— 8	☐ 10"— 6	☐ 11"— 8
☐ 9"— 6	☐ 10"— 8	

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☐ No. 10 Small
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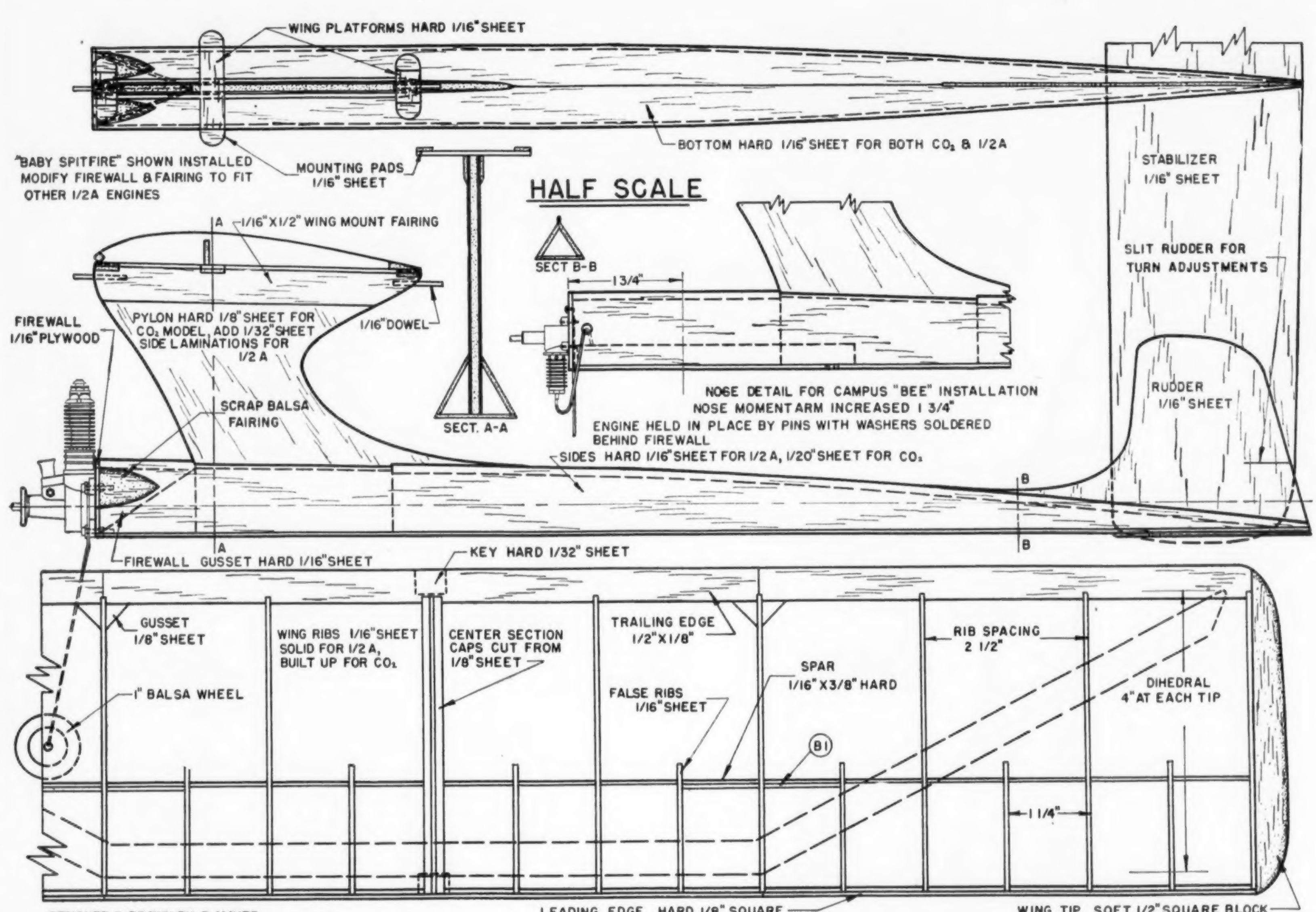
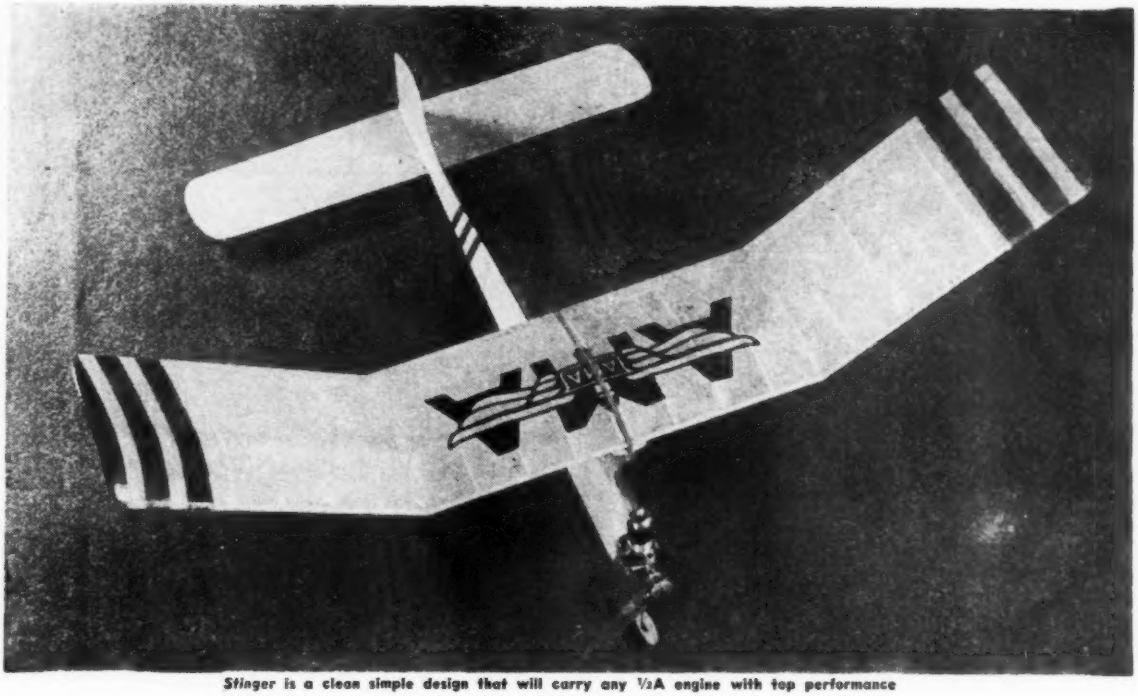

WING PLATFORMS HARD 1/16" SHEET
BOTTOM HARD 1/16" SHEET FOR BOTH CO_2 & 1/2A
"BABY SPITFIRE" SHOWN INSTALLED
MODIFY FIREWALL & FAIRING TO FIT
OTHER 1/2A ENGINES
MOUNTING PADS
1/16" SHEET
HALF SCALE
STABILIZER
1/16" SHEET
A
1/16"X1/2" WING MOUNT FAIRING
SECT B-B
SLIT RUDDER FOR
TURN ADJUSTMENTS
1 3/4"
FIREWALL
1/16" PLYWOOD
PYLON HARD 1/8" SHEET FOR
CO_2 MODEL, ADD 1/32" SHEET
SIDE LAMINATIONS FOR
1/2 A
1/16" DOWEL
NOSE DETAIL FOR CAMPUS "BEE" INSTALLATION
NOSE MOMENT ARM INCREASED 1 3/4"
RUDDER
1/16" SHEET
SCRAP BALSA
FAIRING
SECT. A-A
ENGINE HELD IN PLACE BY PINS WITH WASHERS SOLDERED
BEHIND FIREWALL
SIDES HARD 1/16" SHEET FOR 1/2 A, 1/20" SHEET FOR CO_2
B
B
A
FIREWALL GUSSET HARD 1/16" SHEET
KEY HARD 1/32" SHEET
GUSSET
1/8" SHEET
WING RIBS 1/16" SHEET
SOLID FOR 1/2 A,
BUILT UP FOR CO_2
CENTER SECTION
CAPS CUT FROM
1/8" SHEET
TRAILING EDGE
1/2"X1/8"
RIB SPACING
2 1/2"
SPAR
1/16"X3/8" HARD
DIHEDRAL
4" AT EACH TIP
1" BALSA WHEEL
FALSE RIBS
1/16" SHEET
B1
1 1/4"
DESIGNED & DRAWN BY R. MAYER
LEADING EDGE HARD 1/8" SQUARE
WING TIP SOFT 1/2" SQUARE BLOCK



Stinger is a clean simple design that will carry any ½A engine with top performance

stinger

by ROLAND MAYER

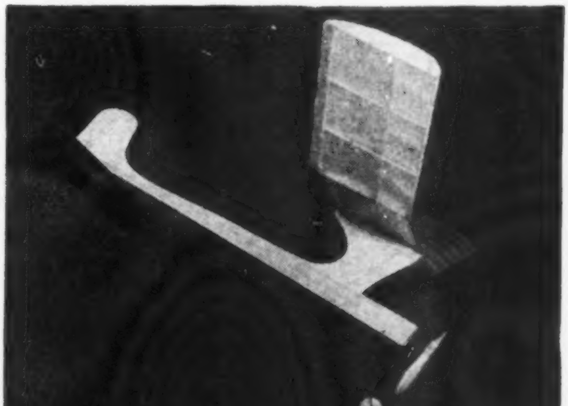
WHILE the battle of the experts rages pro and con concerning professionalism in model flying, the beginner and the less-experienced builder is still in the same old boat—that is, lacking the ability and know-how necessary to build a complex contest ship, he must depend on the simpler designs that he is capable of putting together with a reasonable degree of accuracy. Most of the present designs falling into this category are not even in the same league with a really hot job. So for the present, we will leave it to the experts to decide who will fly when and for what, and do our best to offer at least a partial solution to the immediate problem by presenting *Stinger*, a high-performance half-pint that features the ultimate in simple construction.

Let's list a few features that should delight the heart of beginner and expert alike; the fuselage is of simple sheet balsa construction having a triangular cross section with only one former. The plywood firewall, the rudder, and the stabilizer are also cut from sheet balsa which leaves the wing the only built-up part on the entire ship. Even the wing is of the simplest possible construction. To eliminate any scaling-up from the plans, full size patterns of all parts are included.

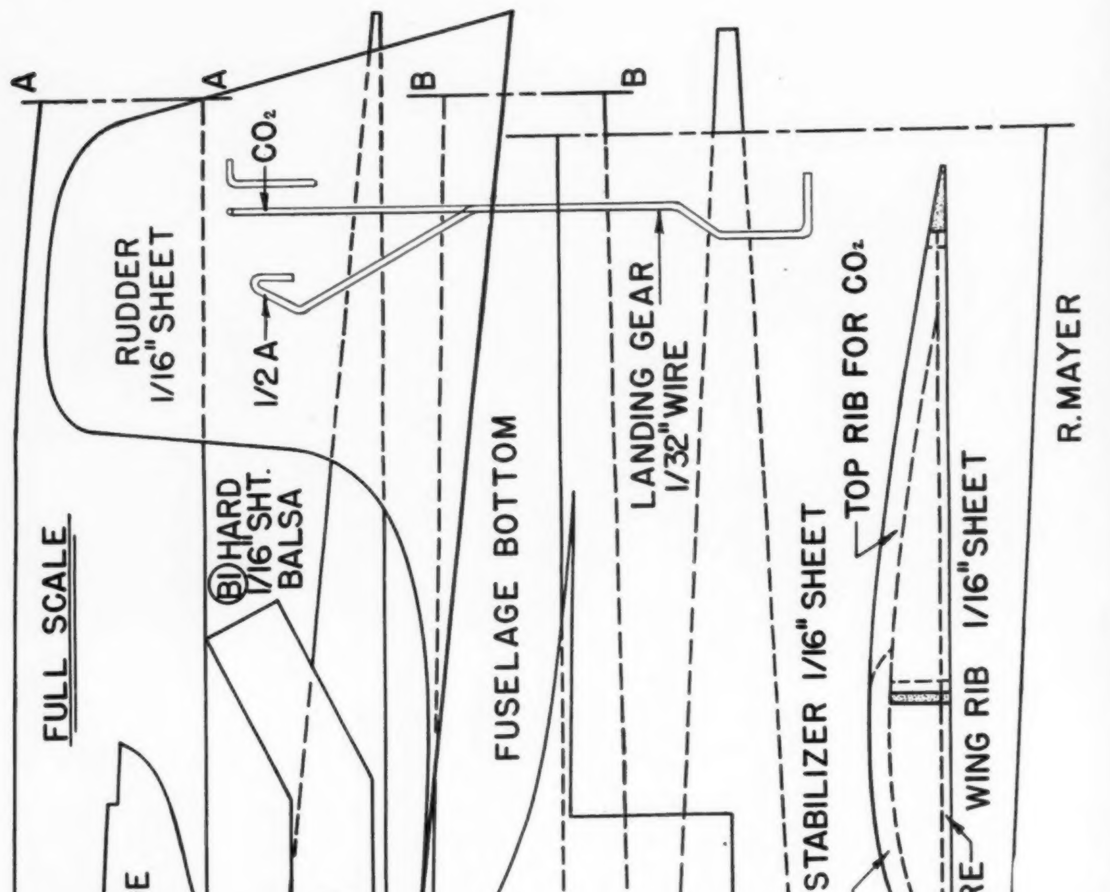
Also included in the plans are the necessary modifications to make a CO_2 version of *Stinger*, employing the *Campus Bee* for power. While in the design and test stages of *Stinger's* development, we tried a lightweight *Bee*-powered version that performed so satisfactorily we felt it would be well worth the trouble to include it in the article for the benefit of CO-Two-fans.

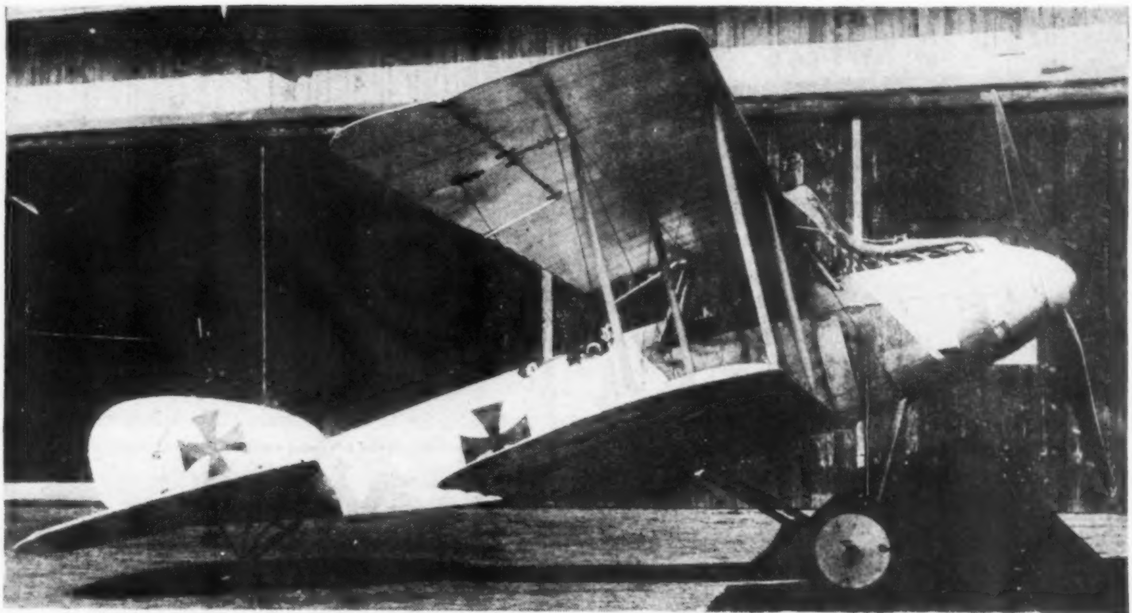
While the CO_2 version is not intended for contest work because of the relatively low power and limited motor run of the *Campus Bee*, the ½A ship is capable of holding its own in any contest. The flying ability of the little ship was graphically demonstrated to us when we carelessly neglected to fit the original model with a dethermalizer dur- (*Turn to page* 56)

Note the large stabilizer and sheet balsa construction



Here, a *Campus Bee* engine with matching propeller is fitted


FULL SCALE
FUSELAGE SIDE
PYLON HARD 1/8" SHEET, ALSO 1/32" SIDE LAMINATIONS FOR 1/2A MODEL
JOIN SIDE AT A-A
A
A
A
A
RUDDER 1/16" SHEET
B1 HARD 1/16" SHT. BALSA
B1
1/2 A
CO_2
FUSELAGE BOTTOM
JOIN BOTTOM AT B-B
B
B
B
B
LANDING GEAR 1/32" WIRE
STABILIZER 1/16" SHEET
TOP RIB FOR CO_2
FALSE RIB
1/16" SQUARE
WING RIB 1/16" SHEET
R. MAYER
SPIT-FIRE
BEE
FIREWALLS 1/16" PLYWOOD



Side view of Albatros 220 hp C. V with radiators on sides of fuselage. Note unbalanced ailerons, and inverted tripod tail skid

WORLD WAR I

ALBATROS C.V PART ONE

by ROBERT C. HARE

IN THE late Spring of 1916, French pursuit pilots began to encounter a new German two-seater operating on reconnaissance, artillery, and photographic missions. The ship was not yet on intelligence reports in any detail, but it had unmistakable lines that left no doubt who manufactured it. And because it was so easily identified, the French had a healthy respect for it.

The new ship was the Albatros C.V, and to the first Allied pilots who spotted it, it looked like a dead ringer for the single-seat Albatros D.I and D.II that had been giving them so much trouble. In fact, early French identification sheets flatly labeled it "an enlargement of the D.I type" without calling it by its proper number designation.

But the inevitable soon happened, and several C.V's were shot down. On examination, Allied engineers found quite a different airplane than they had expected. As more examples were captured during ensuing months, they found that the C.V was built in several different models, each with approximately the same dimensions and configuration, but differing in certain structural and accessory details.

Variations. Before entering into a design description of the Albatros C.V, it may be well to enumerate the variations apparent from drawings and photographs of the type. The basic airplane was powered by a Mercedes D.IV eight-cylinder engine developing 220 hp. Crankshaft speed was 1,400 rpm, but the propeller was driven at 910 rpm through reduction gearing. In order to obtain a symmetrical fuselage profile, the engine was set low in the nose, so the propeller shaft would be in line with the fuselage center line. Thus the engine was completely submerged except for the water expansion tank which protruded slightly over the top of the cylinders.

The Albatros C.V also was produced with the Mercedes D.IV a six-cylinder engine developing 260 hp. This was a direct drive engine, and in order to get the propeller shaft on the fuselage center line, this engine was mounted high, with the cylinder heads protruding well above the top contour of the nose.

Both balanced and non-balanced ailerons were used on the C.V. Balanced portions of the former were always within the wing outline; they were never overhung. Chord of both balanced and unbalanced types was sometimes constant, sometimes diminished at the wingtip by tapering the trailing edge forward; on other models the chord was expanded at the tip.

Another production variance was in the planform of the lower wing. In the basic airplane, the lower wing was of slightly less span than the upper, and with an elliptical tip. Other C.V lower wings were raked at the same angle as the upper, and still others were of the same span as the upper.

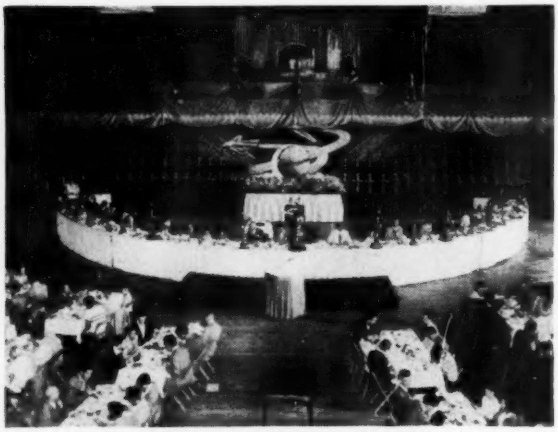
The last major outward difference in Albatros C.V models was the placement of its radiator. The basic airplane was fitted with a wing radiator located in the center section of the upper wing, as in the Albatros D.II and after. Other models of the C.V had semi-circular radiators attached to either side of the fuselage about in line with the leading edge of the lower wing.

Possibly these variations were made on factory production lines from time to time, but more likely were made at repair stations, which would account for the difficulty in establishing just which combination of these elements constituted a "C.V."

In any event, the production of Albatros C.V's was so limited during its short year-and-a-half of service life, that it is likely few were built along any particular com- (*Turn to page* 55)

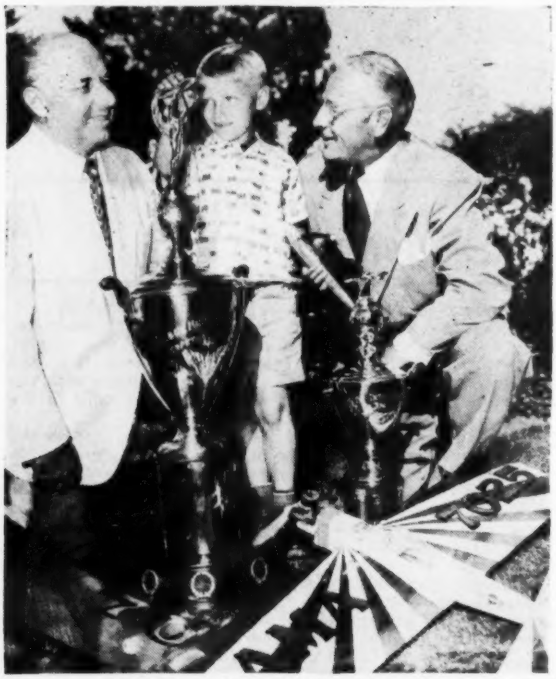
This C. V has elliptical lower wingtips and upper wing radiator

Straight-tipped lower wing, fuselage radiators are featured here



Trophies and Winners' table at Championship Banquet

Feverish activity precedes start of Team Racing Event



R. C. Somerville (left) and H. B. Heberling with top winner Fred Sage

With PLYMOUTH at Detroit

THE Plymouth 4th International Meet has been acclaimed the best ever staged by the Detroit motor company. The accent was on youth this year more than ever before, as evidenced by the fact that entrants were limited to a top age of 20 years; they were split into three classes, *Freshman*—under 12 years old, *Junior*—under 16, and *Senior*—under 21. Entrants were selected, as in past years, by elimination meets held all over the country by local Plymouth dealers. Five hundred of the top winners were selected to compete in the big event, run off August 14 to 21.

At the huge presentation banquet, held on Canadian-owned Bob-Lo island recreation park, a total of 129 trophies and $7,000 in U. S. Savings Bonds were awarded to the deserving winners.

The Freshman Champ was 6-year-old Freddie Sage, of Independence, Missouri, who collected a total of 58 points, the most ever gathered by any Plymouth Meet Champion. He entered eight events and came out with three firsts, a second, a third, a fourth, and a seventh place. Freddie is tops in stunt flying; veteran fliers noted his ability in the Plymouth Meet

David Lefebvre receives Flying Scale Trophy from M. L. Van Dagens

Indoor fliers line up for processing

A group of modelers from the State of Washington

"Flying family" from San Diego: Larry Goodale and parents

last year, and predicted that he would go places in 1950 competition.

Leader among girl contestants was Theresa Grish, 19, whose greatest accomplishment was her record of 130.95 mph in Class B Speed; this topped all the Senior boys who flew in the event.

The Sportsmanship Trophy, which we are glad to note is becoming a fixture at more and more contests, was awarded to Ralph Smith, 20, of East Orange, New Jersey. Ralph had made a high-qualifying score and was entered in Team Racing. When his turn came to fly, he found that members of his ground crew were still flying in other events. He thereupon withdrew from Team Racing competition, and immediately started working as ground crew for others in the same race.

New records in many categories were established, as will be noted in the following list of winners.

Plymouth Fourth International Winners

HIGHEST SPEED JET—Donald R. Zipoy 142.35 mph; BEST POINTS STUNT— Harold C. Reinhardt 364 pts.; BEST POINTS SCALE—David C. Lefebvre 261 pts.; FRESHMAN HIGH-POINT WINNER—Fred W. Sage 58 pts.; JUNIOR HIGH POINT WINNER—Dick A. Modler 56 pts.; SENIOR HIGH-POINT WINNER—Ronald Plotzke 33 pts.; HIGH-POINT GIRL WINNER—Theresa Grish 13 pts.; YOUNGEST CONTESTANT—Gregory E. Wald; SPORTSMANSHIP TROPHY—Ralph Neil Smith.

Indoor Rubber

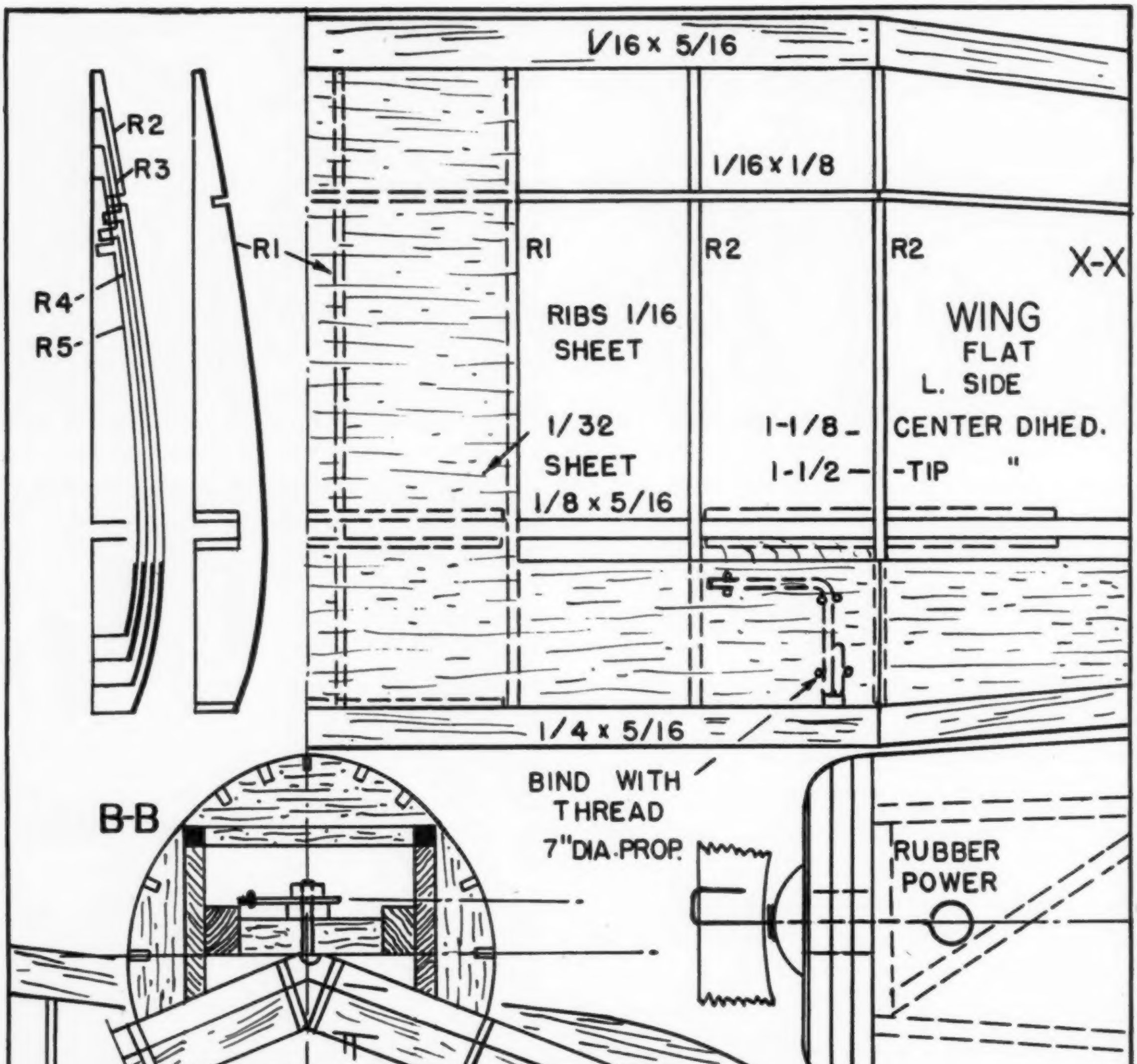
INDOOR STICK *Senior—1.* Ronald Plotzke 1191.6; *2.* Erwin Rodemsky 1159.0; *3.* Anthony D'Allessandro 1032.4; *Junior—1.* Steve Donovich 1051.2; *2.* James Lempke 850.2; *3.* Lyman Slack 769.0; *Freshman—1.* Courtney Pond 321.4; *2.* Theresa Matulis 301.6; *3.* Richard Allen 211.0.

INDOOR CABIN *Senior—1.* Erwin Rodemsky 900.8; *2.* Ronald Plotzke 891.2; *3.* Paul Simon 829.6; *Junior—1.* James Lempke 540.0; *2.* Steve Donovich 383.8; (*Turn to page* 60)

Joe Scuro, Jr., 7, of Pittsburgh, with his rubber stick winner

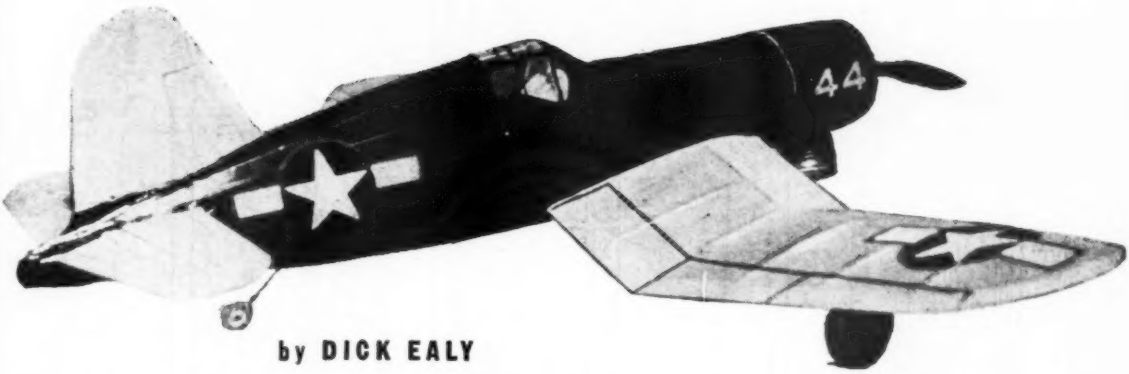
Charles Hallum and Ronald Plotzke untangle indoor model "crash"

Dave and Don Zipoy, of Minneapolis, work on a speed ship



1/16 x 5/16
1/16 x 1/8
R2
R3
R4
R5
R1
R1
R2
R2
X-X
RIBS 1/16
SHEET
WING
FLAT
L. SIDE
1/32
SHEET
1/8 x 5/16
1-1/8
1-1/2
CENTER DIHED.
-TIP "
1/4 x 5/16
BIND WITH
THREAD
7" DIA. PROP.
B-B
RUBBER
POWER
R3
R4
R5
X
X
A-A
C-C
1/8
PLY-
WOOD
BEND
LOOP
1/16 DIA.
STEEL
1-5/16 DIA.

vought F4U-1



by DICK EALY

The "ancient" Corsair is still fighting—build your own model of it

THE *Corsairs* joined Carrier Air Groups through late 1944. Major Gregory L. Boyington, of the *Black Sheep*, moved into the company of Joe Foss and Eddie Rickenbacker by downing his twenty-sixth Jap plane and twenty of his victories were in a *Corsair*. Other sensational victories were chalked up by other squadrons in a few months, including the following: *Wolf Pack*, 86 victories; *Hellhawks*, 94; *Blacksheep*, 62; *Swashbucklers*, 33; *8-Balls*, 28; *Flying Deuces*, 22. The *Corsair* is an all-metal low-wing fighter plane powered by one 18-cylinder twin-row radial air-cooled Pratt and Whitney Wasp engine, rated at 2,000 hp, and is capable of over 400 mph, which made it the swiftest carrier fighter in the world, at that time.

The *Corsair* was one of the heaviest carrier based single-engine fighters, but the cushioning effect of the inverted gull-wing enabled it to take off swiftly and land very easily in spite of its gross weight—11,500 lbs.

Armament usually consisted of three 50-cal. machine guns in each wing. A total of 11,335 *Corsairs* were built, with varying armament. Plans are shown for 1/2" = 1' model, powered by the *McCoy .09* gas engine. Details are also included for building a rubber-powered version.

Make the sides of the fuselage from 1/8" sq. hard balsa, but omit 1/8" sheet balsa sides between station A to D until the wing is mounted. Add the crosspieces as shown in top view, from station A to E. Notch longerons at station E and bend the sides. Bring to a point at the tail end.

Make the wing next. Cut out ribs and taper the main spar as indicated at section B. Build the wing flat and omit ribs R1 and the center rib until dihedral is added. Add 1/16" plywood joiners. Install the wing by sliding it through the gap in the fuselage sides, and cement to lower longeron. This mounts the wing at zero degrees incidence. Make the landing gear struts from .050" steel wire, and fasten to the 1/16" plywood gussets in proper position. Install 1/32" sheet balsa leading edge cap. Cover the center section of wing with 1/32" sheet balsa. Now add the 1/8" sheet balsa fuselage sides, notching them to fit over the wing.

Add 1/4" balsa firewall and bulkhead at station C; install the maple motor mounts, cementing them to balsa sides. Add crosspieces at station B, and bolt the bellcrank with a 4-40 screw.

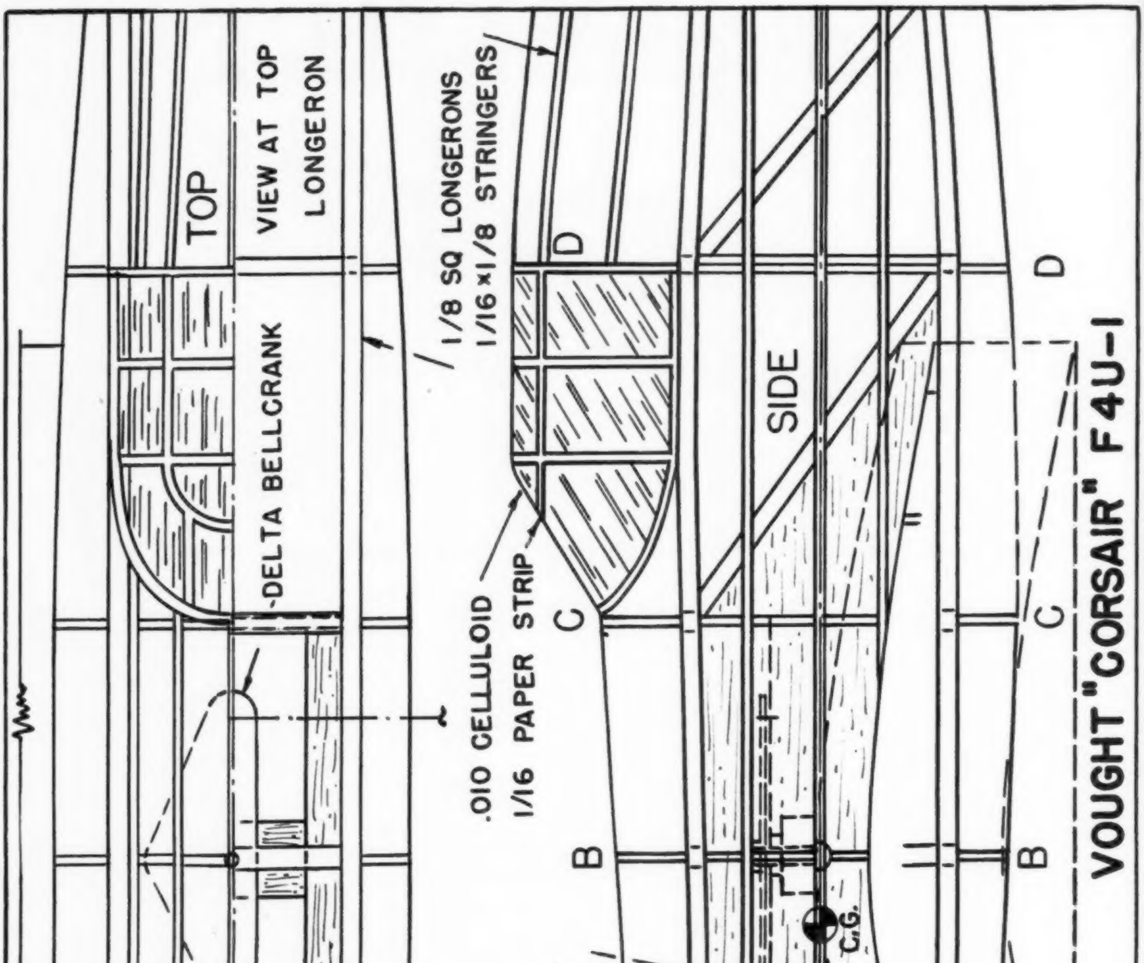
Make the horizontal tail surface and install, then hook up tail horn and bellcrank with .040" wire. Make rudder and install. Make all bulkhead formers from 1/16" sheet balsa and fit in as indicated. Mount tail wheel as shown. Add the fuselage stringers which are all 1/16" x 1/8".

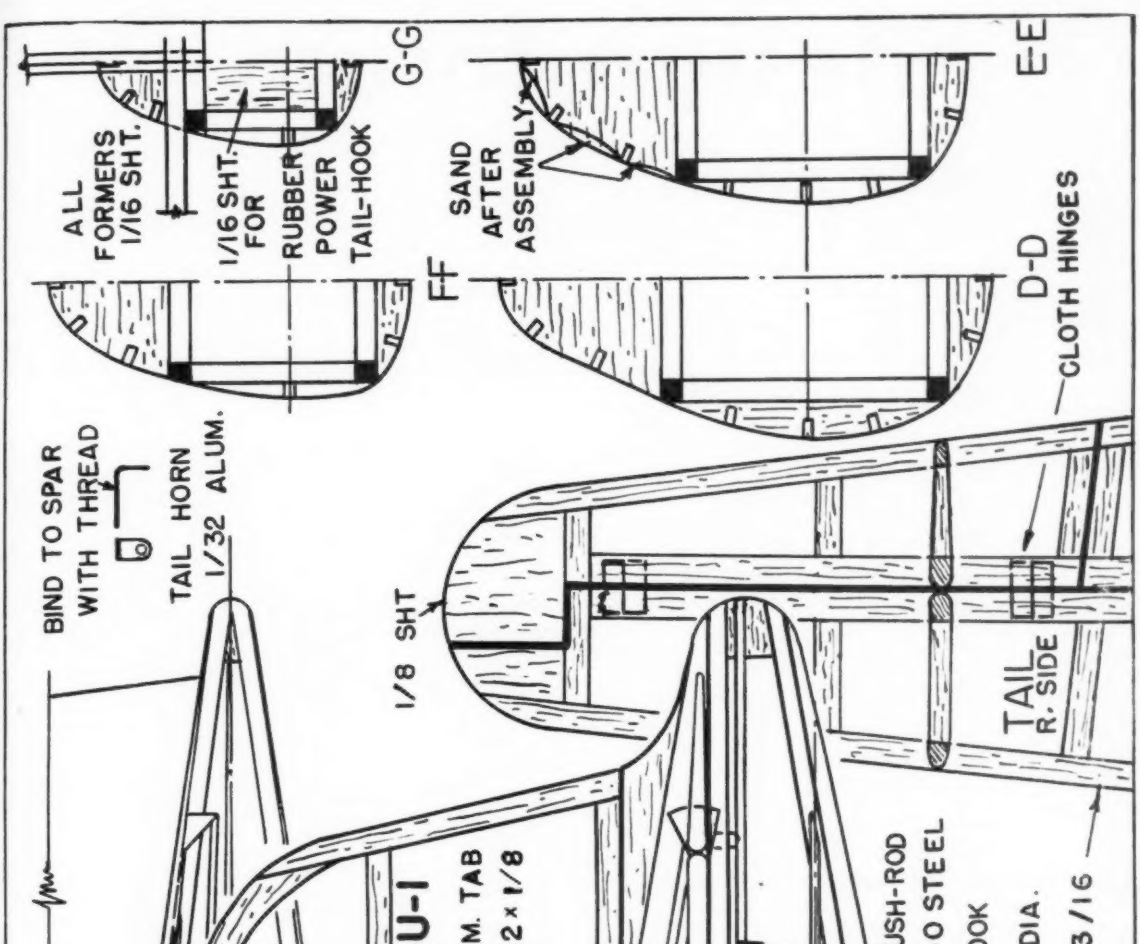
Cover the entire airplane with Japanese tissue paper. Spray with water to shrink the paper, then brush on three coats of medium dope. Make the engine cowling as illustrated. The nose rings are laminated 1/8" sheet balsa. Wrap 1/32" sheet balsa around the rings to complete the cowl. Cover the cowl with Jap tissue.

Mount the *.09 McCoy* glow plug engine inverted. Make a wire frame for cockpit canopy and cover with .010" celluloid. Paper strips are used to denote windows.

When flying, be sure to turn the rudder so that you have 3/8" right offset.

Drawings are included for rubber installation, if you prefer this form of power.


TOP
VIEW AT TOP LONGERON
1/8 SQ LONGERONS
1/16 x 1/8 STRINGERS
D
DELTA BELLCRANK
SIDE
.010 CELLULOID
1/16 PAPER STRIP
C
B
SIDE PANEL
1/8 SHEET
C.G.
A
1/32 SHEET
1/4 x 5/16 MAPLE
MOUNTS
1.14
.225
1/8 SHEET RINGS
1/32 NOSE RING
.09 McCOY
GLOW-PLUG
VOUGHT "CORSAIR" F4U-1


DESIGNED BY DICK EALY
BUILT BY ED BANTA
1/16 SHT.
1/8 x 3/16
F4U-1
ALUM. TAB
1/32 x 1/8
BIND TO SPAR
WITH THREAD
TAIL HORN
1/32 ALUM.
1/8 SHT
ALL
FORMERS
1/16 SHT.
1/16 SHT.
FOR
RUBBER
POWER
TAIL-HOOK
SAND
AFTER
ASSEMBLY
TAIL
R. SIDE
CLOTH HINGES
PUSH-ROD
.040 STEEL
RUBBER HOOK
7/16 DIA.
1/8 x 3/16
1/32 DIA.
STEEL WIRE
E
E
F
F
G
FF
G-G
D-D
E-E

design forum

IF YOU are one of the many hundreds of model fliers who have attended a National Model Airplane Meet or one of the other lesser contests held throughout the country during the past months, you probably have experienced the usual reactions from such events. Throughout the year, before the contests, you have worked with various problems of design and eventually reached certain definite conclusions. These you applied to the designs of your contest models, and you flew them at the contests with the certainty that they would react in a specific manner. Unless you are a most unusual individual, you have come away from the contest completely disillusioned and more confused than ever before. According to theory your plane should have followed a certain performance, but in actual flight its behavior showed no relationship to theory.

Of course, we are talking about free flight. In controline flying, problems are greatly simplified, the advantages taking the form of thrills rather than increased knowledge concerning the problems of flight. Confused ideas resulting from a few days of flying free flight models is a common occurrence because of the many factors involved in flight maneuvers. Designing a perfect model is no less difficult than designing a full scale plane, if structural problems are not considered. Therefore, in order that beginners may have some degree of success, certain basic truths must be clearly understood and must take precedence over many other factors which are relatively unimportant. The best procedure for both beginners and experts in designing a new model is first to build a very simple experimental plane and determine its flight reactions. The behavior of a model is influenced by the form, proportion and relative position of its fundamental units. Therefore, if even an all balsa model is constructed in the proper form, it will register a performance similar to that of the final and more structurally complicated contest model design which may be built later. So to clarify ideas and to save many hours of work (and many crackups) we suggest that you design and construct all-balsa prototypes of models which you intend to enter in later contests. These prototypes also will provide a great store of general information.

by CHARLES H. GRANT

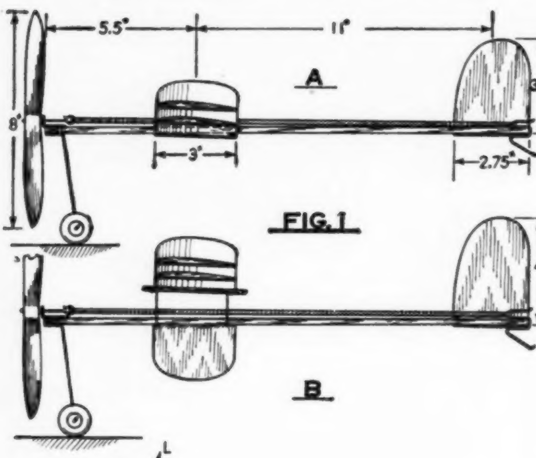


FIG. 1

B

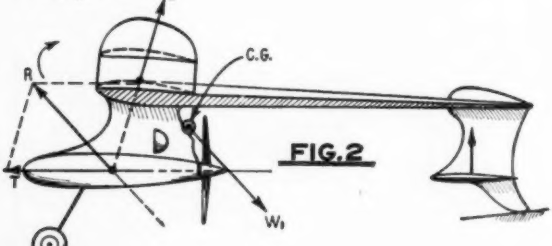


FIG. 2

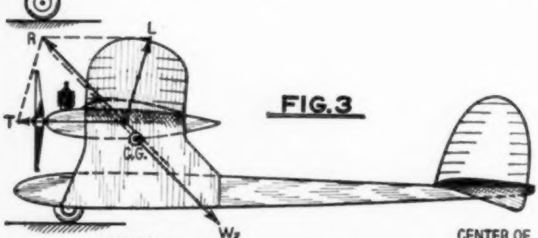


FIG. 3

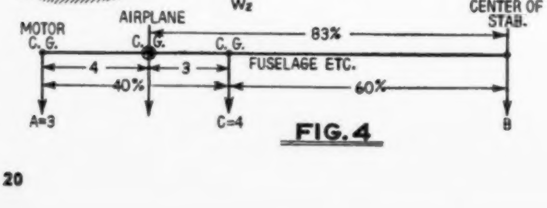


FIG. 4

Several months ago we gave the proportions of a simple basic tractor model. Summarizing, they are as follows: wingspan 21", chord 3", wing maximum camber 1/4", stabilizer span 8-1/2", stabilizer chord 2-3/4", fin height 3-1/2", fin width 2-3/4", tail moment arm 11" (distance from center of wing to center of tail), nose length 6" (distance from center of wing to propeller bearing), propeller diameter 8", propeller pitch 12", propeller blade area (actual area of two blades, one side) 8 sq. in. The fuselage in this case may be a 1/4" sq. balsa stick 18" long; landing gear of 1/32" diameter wire with 1" diameter wheels, which may be attached to the nose. Power should be 4 strands of 1/32" x 1/8" rubber; the motor should be mounted above the stick; the wing should be attached to the stick and beneath it. Drawings of this plane are given in November, 1949, issue, of MODEL AIRPLANE NEWS, page 22. Wings can be made of 1/32, 3/64 or 1/16" thick balsa with four ribs cemented to the underside, two on each half wing at appropriate intervals for strength and shape. The trailing edge of the wing should be 1/8" lower than the leading edge to give proper angle of incidence. The stabilizer should be parallel with the stick at 0° angle of incidence; dihedral should be about 10°, that is, each wingtip should be raised approximately 2" above the wing center.

This is your basic prototype test model. Build it and fly it and learn *all* of its tricks. Learn how to control it, for this is one of the greatest factors for success in contest flying. If you know how to create certain reactions by warping surfaces, changing angles or position of surfaces, you will know how to correct unwanted reactions and know the cause of erratic flight maneuvers. This in itself is a science which usually is born only of long experience. Winning a contest depends not only on having a well-designed model but in knowing how to handle and adjust it. Flying a simple all-balsa prototype as suggested will give you this experience and demonstrate the reactions resulting from particular design combinations and adjustments.

Let us assume you know something about the reactions of this basic model. Now you can experiment with variations. One of the most common is a parasol wing. Most contest models at present take this form. Change your basic model by adding a wing mount so the wing is 1" to 1-1/4" above the stick. Mount the wing so that its angle-of-attack is the same as in the basic model, with the trailing edge 1/8" lower than the leading edge, measured from the thrust line which is the center line of the propeller shaft extended. Do not change the stabilizer or fin.

Now, fly your model and see its reactions. If it behaves like all other test models of this arrangement, it will stall, with the wing in the same position, measured horizontally. What is the reason? The wing is raised and the center of resistance or drag has been raised also, so the drag pushes back at a higher position with the propeller pulling forward below it. This causes a nosing-up couple which usually produces stalling tendencies. To correct it, the simplest method is to move the wing backward until the proper trim for power flight is obtained.

However, with trim for power-on, you will notice that the glide is much steeper without power. This is the result of increased nosing-up moment with power on, compared to the same moment with power off, and is due to the higher line of resistance and higher wing. What is the cure (1) the stabilizer angle-of-incidence must be increased to lift the tail under power and overcome the nosing-up tendency. Usually the stabilizer must be given plus 1° angle-of-incidence, and (2) the wing often (but not always) must be set at a smaller

(*Turn to page* 40)

Second-place winner F. W. Evans of Great Britain (winding) gets help from H. Stevens

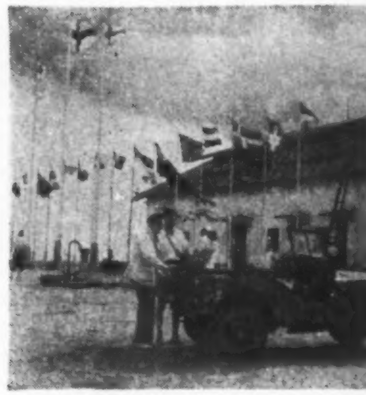
Aarne Ellila, who won the Wakefield Meet for Finland; he was also 1949 winner

Italy took third place through the efforts of A. Leardi, shown weighing-in

FINLAND WINS THE WAKEFIELD

by E. A. SEVERI

Pipe-smoking modelers H. Orwin of Norway and Petersen, Denmark



Flags of 16 nations flutter in front of Jamijarvi Soaring School building

THE lonely Jamijarvi Soaring School in the Southwest of Finland has surely never seen representatives of so many different nations collected in its shelters at the same time, as during the twentieth and twenty-fourth of July, when the most famous international aeronautical contest of the world, that for the Wakefield Cup, took place. The world-championship was scheduled to be decided at Jamijarvi.

The honor of arranging for the event fell upon Finland, due to the fact that Aarne Ellila won the contest in England last year and brought the cup home. It was a great task, but if you are really willing, you can arrange a lot of things. The event required some special arrangements since it had been announced that the contest would be held in the nighttime, under the never-darkening sky of the North; because of this timing, neither wind nor thermals would interfere to make it just a contest of good luck. Under these circumstances, the event was most successful; good luck was not the deciding factor this year—the models themselves had to be good.

As a surprise to many, but not as he did it last year, Aarne Ellila was in the lead right from the beginning, and he won without having to come up from behind, as was the case in 1949. F. W. Evans from England was the second best, and the Italian, A. Leardi, was third.

The actual contest took place during the nights of July twenty-second and twenty-third. The first modelers arrived at Jamijarvi on the evening of the eighteenth; they were the Belgians, who surprised everybody since the first teams were expected to arrive no earlier than the evening of the twentieth. Modelers were still straggling in on Friday evening when all the quarters of the school were filled with representatives of many foreign countries.

The teams which arrived in the evening were bidden welcome next morning before breakfast by Professor Wegelius, who is the vice president of the Finnish Aeronautical Association. After that every one took his place at some table and a babble of all sorts of languages started, which made the dining room very lively.

All the competitors, except the British, came by bus from Tampere. The Englishmen arrived in their own plane at Pori, a town near Jamijarvi, and were brought by car to the site of the meet. After they had arrived, it was announced that sixteen different countries were represented, and a total of sixty-two persons would take part in the contest, including the eighteen proxy fliers. This number was fairly close to the previous calculations. In addition to the fliers, there were many foreign spectators and journalists; almost a hundred foreigners were in attendance.

In front of the aeronautical school, the flags of every country which took part in the event fluttered in line, showing the

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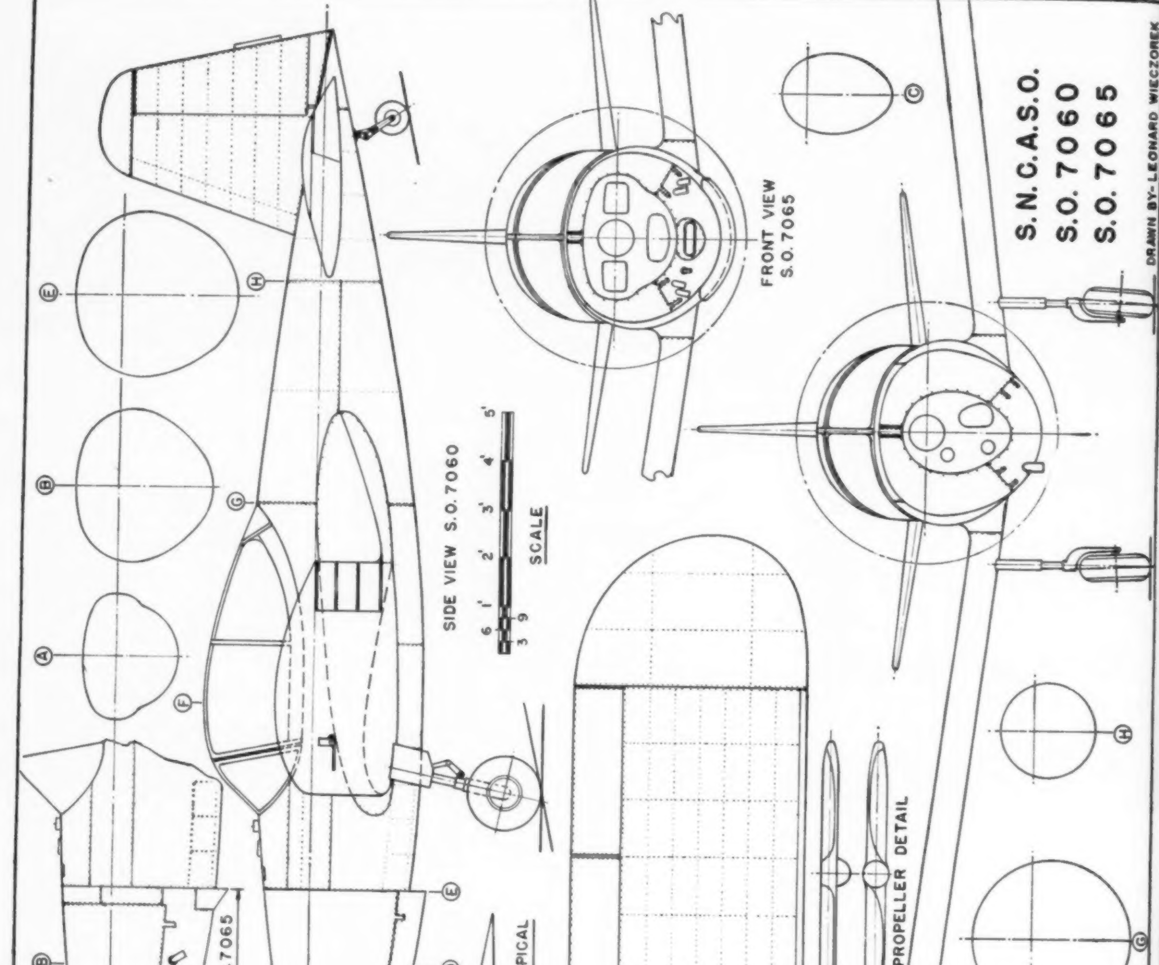
A line-up of competitors and proxy fliers ready for official flying

Ellila gets a helping hand. L to R—Orvin, Ellila, Johanson, Kivinen and Segerfelt


S.N.C.A.S.O.
S.O. 7060
S.O. 7065
DRAWN BY- LEONARD WIECZOREK
FRONT VIEW
S.O. 7065
SIDE VIEW S.O. 7060
SCALE
SIDE VIEW S.O.7065
WING SECTION-TYPICAL
PROPELLER DETAIL
TOP VIEW S.O.7065

French Sportplane

THE United States invented the airplane but it was France that nurtured it from a frail infant into a strong, healthy child that is still growing. The Wright Brothers first flew on Dec. 17, 1903, but it was not until Aug. 2, 1909 that the first Wright airplane was accepted by the U. S. Army. The first airplane flight on the continent of Europe was made Aug. 14, 1906—less than three years later—by Alberto Santos-Dumont in a ship of his own design conceived quite independently of the Wright Brothers.

This flight touched the spark of French inventiveness and brought forth a deluge of now-historic names that launched France into a world aeronautical leadership that she held for a quarter-century. In March, 1907, Gabriel Voisin made the first long airplane flight in Europe and that same month Leon Delagrange made his first flight in an airplane built by Voisin. Henri Farman flew first in a Voisin machine in September, 1907. Farman and Delagrange alternately broke records for distance and duration and in the next two years they were joined in their record breaking by such famous French aviation names as Hubert Latham, Louis Paulhan, Labouchere and others.

Wilbur Wright, disappointed at the business prospects for airplanes in the U. S., took his famous airplane to France and made his first flight Aug. 8, 1908, at Le Mans (where a monument commemorating the event now stands). Louis Bleriot, who had first flown in April, 1907, in his own monoplane, made his triumphant flight across the English Channel on July 25, 1909, and Glenn Curtiss arrived in France in August, 1909, to sweep the prizes at the famed air meet at Rheims. All of this record-breaking activity occurring while the first U. S. airplane was yet to be delivered to the U. S. Army.

France did not let up in her conquest of the air. A review of her airplane armada of 72 airplanes was held at Villacoublay on Sept. 27, 1912, and in the three air meets in which she participated in this country her aviators completely smothered U. S. competition. When the world went to war in 1914 France had 260 airplanes compared to 100 Russian, 46

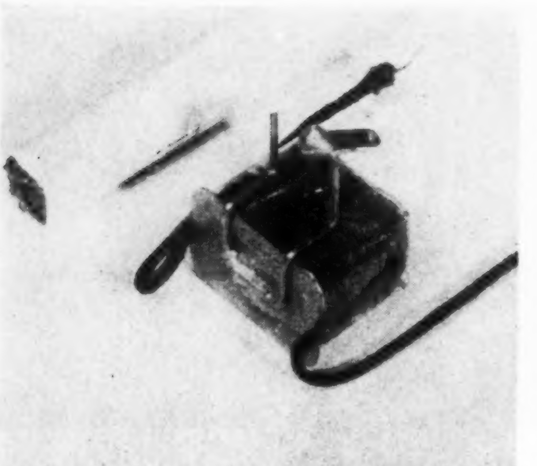
by ROBERT McLARREN

German, 29 British, 26 Italian, 14 Japanese and *six American!* Throughout World War I France out-produced all of the warring nations and by Armistice Day she was regularly producing 3,000 airplanes a month, the world's largest aircraft industry! Not only did this tremendous industry fill all of France's own air force needs but supplied 9,000 airframes and 20,000 engines to the British and U. S. air services.

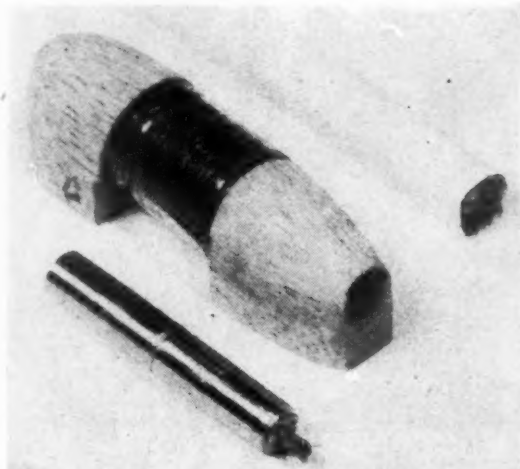
In addition to this production leadership, French aircraft designers led the world in the performance and efficiency of their aircraft and France was the envy of the world during the golden days of her aerial supremacy from 1922 to 1932, when Great Britain and the United States finally overtook her. The final blow fell on August 11, 1936, when the French Senate passed the Law for the Nationalization of Military Industries and the Socialist Government of Leon Blum took control of the aircraft industry. The French aircraft industry had one more brief period of leadership from 1938 to 1940 when she performed the greatest rearmament in the air of all times under the pressure of the Nazi attack, an expansion and production miracle unmatched by even the U. S.

On June 17, 1940, the French Government capitulated to Germany and three days later the government of Marshal Petain cancelled all manufacturing contracts, ordered the storing of all French aircraft in controlled depots and the immobilization of all French aviation activities. This was the blow from which France has never recovered. In July, 1941, an agreement was reached between the German authorities and the Vichy government for the production of German aircraft by French manufacturers under the direction of the German aircraft companies. Under this program various French factories produced the Junkers Ju 52 transport, Messerschmitt Me 108 light transport, Focke-Wulf Fw 189 twin-engine reconnaissance machine, Focke-Wulf Fw 190 fighter and others. This resulted in complete transition of the industry from its own patterns and completely demoralized the equipment, personnel, techniques and continuity of the French aircraft industry.

(*Turn to page 57*)



This rotary actuator has no iron aside from disc magnet and shaft



Cigarette shows size of slide-type actuator; note double magnet

SIMPLE PROPORTIONAL CONTROL

THE JET and the rocket engines were demonstrated much earlier than the reciprocating engines. Because useful results were obtained more easily with the reciprocating type in those days, nearly all development was concentrated on it. It was not until the forced development stimulated by a world war that the possibilities of the jet engine were realized.

Could it be that we have been overlooking some possibilities in some of the early proposals for R.C.? In 1935 the writer can remember an article which advocated a form of *pulse proportion*. That seemed to be the right road to travel, for the ultimate goal of performing aerobatics with a radio control model that would match those of the *Travelair* or the *Waco* of that day.

This ambition finally came close to a reality, when at the 1947 Nationals "yours truly" received full credit from the judges for successive loops, Immelman turns, Chandelle turns, wing-overs, whip-stalls, (and also some that were not in the book).

If a few of us put our heads to work on it we may all be surprised at the results. The writer will attempt to convey to you the results of fifteen years of study and experimentation on the *Pulse Proportion and Pulse Rate* systems. Jim Walker has several patents on a form of pulse proportion, but pulse rate is presumably original with the writer.

In 1947 the *Actuators* used were of a type rather difficult to build. (See M.A.N. for June, 1947.) Since that time they have been developed into a simpler form and can be built with the tools to be found in the average shop.

The first and foremost advantage of the system is, as the name implies, proportional control; this means that the control surface on the plane operates in the same proportion as the control in the operator's hand. You can make gentle turns, or tight turns, or spiral dives at will. You can give it full rudder to start the turn quickly, then when the plane has assumed the desired bank, release some of the pressure on the rudder so it will maintain just the degree of turn required. Also, the rudder can be varied continuously in order to compensate for the rough air encountered at times.

There is no sequence to get fouled up on. As you move the control stick, so moves the control surface in the plane. If your radio misses a signal now and then, it has very little effect on the action of the plane, nor does random interference cause much trouble.

The system will work with any R.C. transmitter and receiver as long as the relay in the receiver has double contacts (single-pole, double-throw).

The escapement of the now popular system is done away with and taking its place is a special little gadget developed by the writer. The most appropriate name that came to mind for this gadget was *actuator*, because that is just what it does —it actuates the control that is connected to it in the plane.

There is nothing that ever requires adjustment once an *actuator* is built. There is nothing about it that is affected by vibration or wind. It will not suddenly quit working due to low batteries. The weight is somewhat less than that of any other type of rudder mechanism known, and it will operate on considerably less battery power. It is the writer's experience that an *actuator* requires about a third as much battery power as the average escapement. Also experience has shown that most planes of the sizes flown today can be controlled by an *actuator* weighing less than an ounce.

The *actuator* is in effect an electric motor which makes only half a turn in either direction. When the voltage is applied, the armature will jump to one of its limits; when the polarity of the voltage is reversed the armature will jump to its opposite limit. This movement is connected to the rudder horn through a push-pull rod so that the rudder moves only a small amount for the entire movement of the armature in the *actuator*.

The relay in the radio receiver connects the battery voltage to the *actuator* with one polarity when there is no signal and with the opposite polarity when a signal is received. The writer started out with the batteries connected in a manner that a signal gave right rudder, and no signal, left rudder. (Can't figure any good reason for this arrangement, or the opposite either, so for the sake of explanation let's assume this connection.)

Now then, if we use an ordinary push button to key the transmitter and set the limits on the rudder's movement so it cannot turn the ship tight enough to spin it in, we can fly straight by keying the transmitter on and off evenly. Push the button, and before the ship can start the turn to the right, release the button; again, before the ship can turn to the left, press the button. Thus by merely keying the transmitter on and off evenly the ship maintains a straight course. For a right turn you just hold the button down, or for a left turn, release the button as long as you want the ship to turn.

This method has been used on a few flights, and it was a lot of fun, but it leaves much to be desired when it comes to stunting. If the limits are moved out on the rudder so you can spin the ship, it becomes necessary to work the button too fast for comfort, and it is difficult, to say the least, to proportion the on and off time to keep a steady course.

It is evident that some form of mechanical pulser with provisions for varying the on-off proportion is a necessity. There are two types that have been used and details of their construction will be given in the next article. You might, of course, develop a different form that more nearly fits the materials you have around the shop.

The only function of the pulser is to key the transmitter on and off rapidly, and to provide a means for you to vary the proportion of on- to off-time. One extreme of the control would keep the signal keyed on all the time, the other extreme would keep it off all the time, corresponding to full right rudder and full left rudder respectively. If the control were held in a position, say one third from the left extreme position, the rudder on the ship would be turned left two thirds of the time, and right one third of the time. The net effect on the plane

PART ONE

would then be a third of full left rudder because the amount of time the rudder was turned right would counteract the same amount of time from the left rudder. If the control is held in the center position, the signal would be keyed on half the time and off half the time, to give us right half of the time and left half of the time, resulting in no effective rudder. From this we see that the amount of effective rudder is proportional to the position of the manual control on the pulser. The fact that the rudder is snapping back and forth all the time is of no consequence, as it is happening too fast for the ship to follow anything but the average position.

by GEORGE E. TRAMMELL

A geared electric motor was installed to actuate the rudder on the first model. This does not work out the way one might imagine at first. The motor with gear train is too slow to follow the pulsing; when the control is moved slightly off to one side, the motor will gradually creep in that direction, causing the ship to get more and more rudder. If the control is now centered the rudder does not return to neutral but only wavers slightly, remaining in the same position it had reached before the control was centered. It was found necessary to give opposite rudder until the control surface reached neutral, then neutralize the control. While it is possible to control a model pretty handily this way, it was not quick enough to fulfill the writer's requirements.

After much thought on the subject, along with some reading, an *actuator* similar in principle to the present one was designed, and after several were built, one was efficient enough to try. The very first flight proved it to be just what the doctor ordered. Several similar ones were built with varying degrees of success, then came the long silent period.

The July, 1947, issue of M.A.N. carried the article giving drawings and a brief description of these *actuators*, and of the pulse system. Since that time the system has remained the same, but the *actuators* have been improved and simplified.

Experiments along several lines of thought have not proved as successful as the old system, so it looks as though the writer is sticking with it a little longer—at least until someone can show up with a system offering advantages not to be found in any other that is currently popular.

Now, let's take a look at the drawings and get down to the details of building one, or both types of *actuators*. You might wish to try one in place of your escapement, controlling with a push-button as mentioned earlier, before building the pulser ground control.

The straight solenoid, or push-pull type, shown in Fig. 1 may be found somewhat simpler to build, if it fits the material you find handy. The rotary type, Fig. 2, has several advantages, even if there is a little more work to constructing it. Let's look at a couple of its advantages: first, it has a more even power stroke. When linked to a long control horn on the rudder from a very short arm on the *actuator*, the leverage increases toward the ends of the stroke; this is just what we need, since the pressure builds up on the rudder as it is moved further off-center. Second, it is inherently balanced so that it doesn't give you more of one rudder position in a climb, and more of the opposite in a dive. This, of course, is of no consequence if you do not intend getting this ship into stunting attitudes.

Here is a detailed description of the construction of the solenoid type. The armature is made of two pieces of alnico bar. You may use either flat or round bar with equal results, but the round stock is easier to work with.

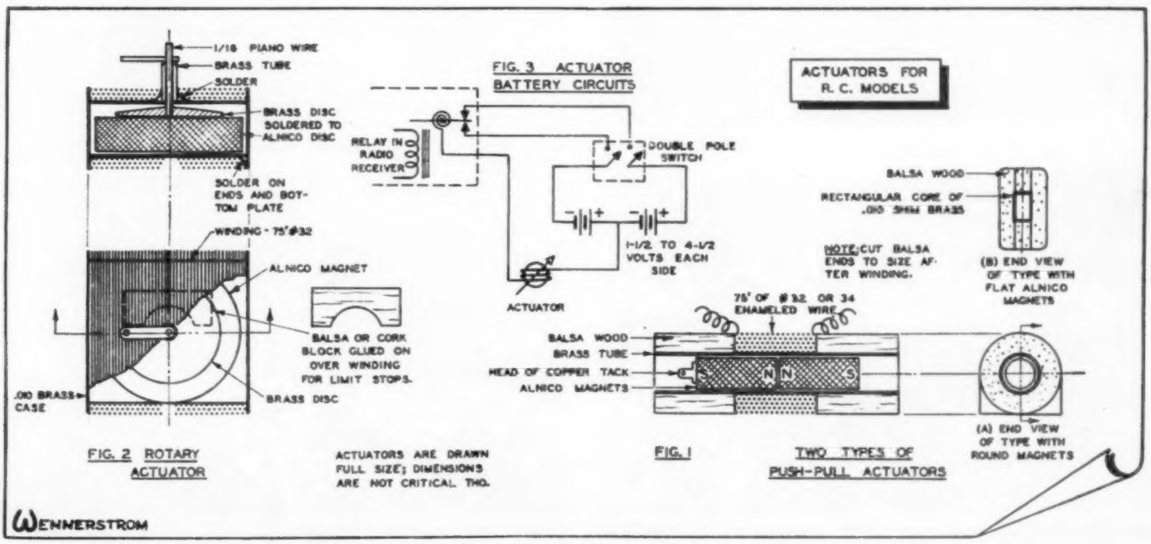
There are some "ships compass compensating magnets" on the surplus market. These are 1/4" alnico rods about 4" long, ground smooth and then lacquered. This saves a lot of work on the polishing as all that is needed is a little glow fuel or acetate to rub off the lacquer. If you do not have the luck to find one of these rods, and get hold of some rough cast material instead, you are in for some work grinding the entire surface smooth and polished, for the magnet must slide freely in the brass tube.

If you have the long bar, put one end in the vise with about 3/4" projecting; a light tap with a hammer will neatly break the bar off. Repeat the operation as we will need two magnets. Next grind the ends true, and make both exactly the same length.

A soft wheel of 60 or 80 grit is best for grinding this hard material. If there is no facility for keeping the grinding wheel wet, the little bars will have to be dipped in water frequently to keep from burning your fingers.

The next step is to solder the magnets together, end to end. They must have like poles together; this is the direction in which the two pieces repel each other, or jump apart, if released. You will need a block with a groove in which to place the pieces while soldering, so they will be lined up as a straight bar. Put a stop in the groove to push one end of the bar against, as you will have to push them together while soldering, and hold them this way while they are cooling.

A few words about soldering this uncooperative material might be in order. First, a good acid flux is a must. There is one on the market known as "Ruby Fluid" which works fine. Most welding or sheet metal shops have this or a similar flux for soldering stainless steel. There may be other suitable fluxes but this one we know works. Place the pieces in the vise with one end sticking up above the jaws. Use a piece of cardboard on each side of the bars so the heat will not be lost in the vise. Place a drop of acid on the ends and smear it around to cover the entire surface. Have the soldering iron good and hot and well tinned with solder. Touch just a little solder to the tip and immediately place the tip squarely on the end of one of the alnico bars and hold it there a few moments. When the iron is lifted, the solder should appear as a thin shining liquid. If the solder has a grainy texture, it is a sign the iron is too small or not hot enough. Most 100-Watt electric irons are hot enough for the job. If the solder did not adhere in some spots, put on more acid and apply the heat again, but if the surface develops any dark spots it will be necessary to grind a new bright surface and start over (*Turn to page* 54)



AIR WAYS

News of Model Builders from All Over the World

No. 1 B. N. Felstead with his indoor stick

No. 2 R. O. Paul sent shot of Warren Fletcher

NOW THAT THE DUST has settled (more or less) on the contest season for much of the country, we can look back over some of the events, to see what can be done to pep them up for 1951.

One event that really needs "pepping" is Free Flight Rubber Scale. Though we continue to publish three views and construction articles in this category, there just are not enough entrants to make the event of real importance. From one of the hottest events at prewar Nationals, Flying Scale Rubber has slipped to the point where the Nats is about the only meet big enough to make it worth while. Despite this, free flight scale interest is *not* dying out—in fact, it seems to be increasing. To bring this colorful event back to life, we believe it requires only a broadening of the base, so to speak.

Discussions with many scale model builders at the Nationals and since have shown that the present scale builders are working with other forms of power, principally ½A engines. Therefore, why not broaden the rules so that *any* sort of power—rubber, ½A gas, CO2, *Jetex*—could be employed. It would probably be necessary to limit the engine runs; ½A engines could be held to 15 secs., CO2 to one cartridge, and so on. Rubber, of course, would be unlimited, but to hold things within reason, it might be wise to set an upper limit on wingspan or area.

Some scale proponents would like to see the actual flying done on a duration basis, as at present. Others feel that the models should simply be required to R. O. G. (unassisted!) and fly for a specified minimum time—for example, 30 secs. —to prove they are genuine *flying* scale models. This practice would follow the U-control scale event.

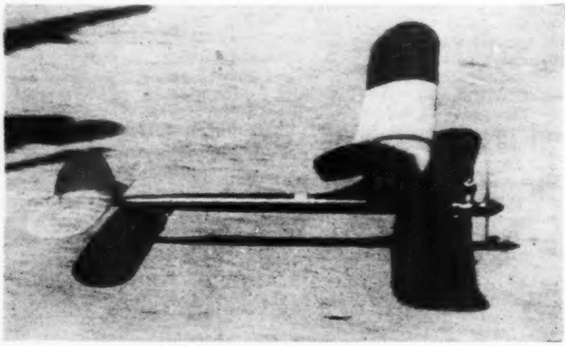
We believe that a simple set of rules could be set up that would make flying scale a "must" event at all large meets. Thousands of modelers are building and flying beautiful scale ships right along. Let's give them an event that will allow them to get these realistic and true-to-scale flying models into competition.

RADIO CONTROL FLIERS in the Chicago area put on such a campaign that an R. C. event was included in the 42 events, when the Chicago Plymouth Dealers held their qualifying meet at Glenview Air Base in June of this year. The R. C. boys competed for the "Maurice Roddy Memorial Trophy." Maurice will be remembered as aviation editor of the CHICAGO SUN-TIMES. He was very well known in model aviation circles; in fact, he was stricken fatally while attending the 1949 Nationals.

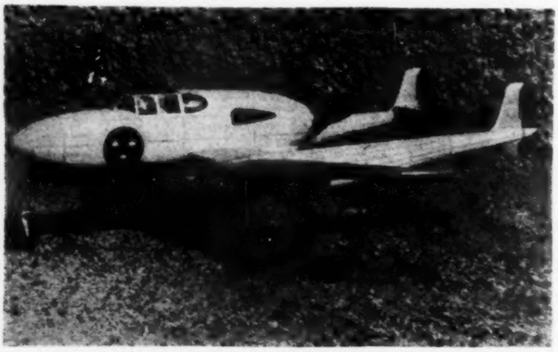
A total of twenty-one radio control fliers, assisted by a top-notch judge, Jim Ganyo, really put on a show at this Plymouth-sponsored meet. We are informed by veteran R. C. flier Clay Freese that the event was so popular it will undoubtedly be included in future Plymouth meets to be held in the Chicago area. The Chicago boys feel this first try was such a success that R. C. must eventually be flown at the International Meet in Detroit. They ask—why not in 1951?!

The winner at Glenview was E. Paul (*Turn to page* 50)

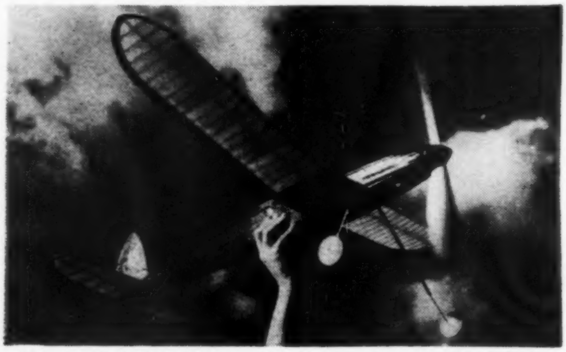
No. 3 Paul Johnson receives Plymouth R.C. award from Lieut. C. B. Stone



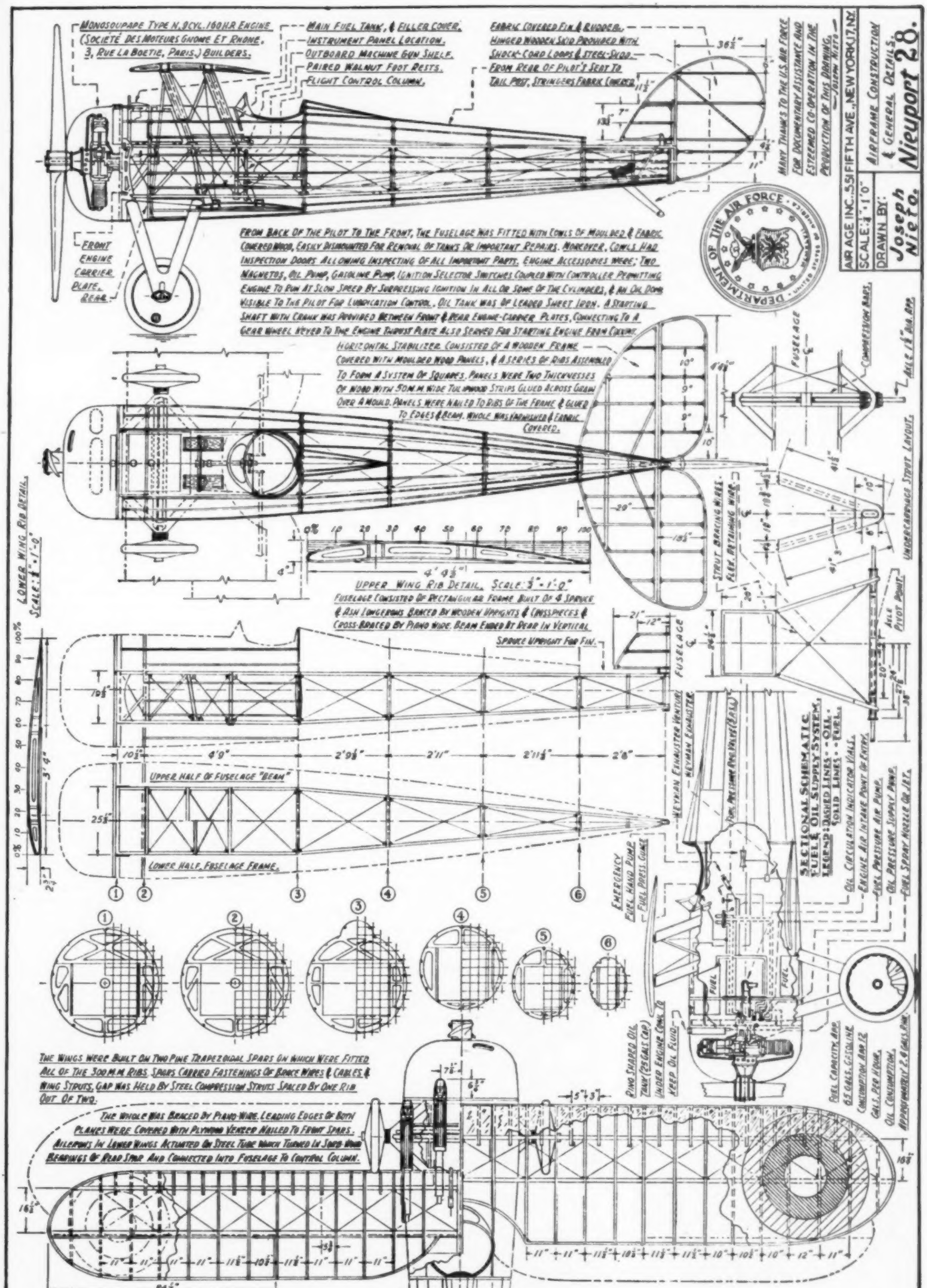
No. 4 A real "pencil bomber" taking off; photo by Curtis Irby, Jr.



No. 5 Realistic scale model built by Nils Gunnar-Berg; it's a SAAB J21



No. 6 Wakefield job by Ronald Adams shows very fine photography


Nieuport 28.
Airframe Construction & General Details.
AIR AGE INC., 551 FIFTH AVE., NEW YORK 17, N.Y.
SCALE: 1/4" = 1'0"
DRAWN BY: Joseph Nieto.
Many Thanks To The U.S. Air Force For Documentary Assistance And Esteemed Co-Operation In The Production Of This Drawing. —Joseph Nieto—
DEPARTMENT OF THE AIR FORCE
Monosoupape Type N, 9 Cyl. 160 H.P. Engine (Société Des Moteurs Gnome Et Rhone, 3, Rue La Boetie, Paris.) Builders.
Main Fuel Tank, & Filler Cover.
Instrument Panel Location.
Outboard Machine Gun Shelf.
Paired Walnut Foot Rests.
Flight Control Column.
Fabric Covered Fin & Rudder.
Hinged Wooden Skid Provided With Shock-Cord Loops & Steel-Skid.
From Rear Of Pilot's Seat To Tail Post, Stringers Fabric Covered.
Front Engine Carrier Plate. Rear.
From Back Of The Pilot To The Front, The Fuselage Was Fitted With Cowls Of Moulded & Fabric Covered Wood, Easily Dismounted For Removal Of Tanks Or Important Repairs. Moreover, Cowls Had Inspection Doors Allowing Inspecting Of All Important Parts. Engine Accessories Were; Two Magnetos, Oil Pump, Gasoline Pump, Ignition Selector Switches Coupled With Controller Permitting Engine To Run At Slow Speed By Suppressing Ignition In All Or Some Of The Cylinders, & An Oil Dome Visible To The Pilot For Lubrication Control. Oil Tank Was Of Leaded Sheet Iron. A Starting Shaft With Crank Was Provided Between Front & Rear Engine-Carrier Plates, Connecting To A Gear Wheel Keyed To The Engine Thrust Plate Also Served For Starting Engine From Cockpit.
Horizontal Stabilizer Consisted Of A Wooden Frame Covered With Moulded Wood Panels, & A Series Of Ribs Assembled To Form A System Of Squares. Panels Were Two Thicknesses Of Wood With 50 M.M. Wide Tulipwood Strips Glued Across Grain Over A Mould. Panels Were Nailed To Ribs Of The Frame & Glued To Edges & Beam. Whole Was Varnished & Fabric Covered.
Compression Bars.
Axle 1 1/8" Dia. App.
Undercarriage Strut Layout.
Strut Bracing Wires.
Flex. Retaining Wire.
Lower Wing Rib Detail. Scale: 1" = 1'-0"
Upper Wing Rib Detail. Scale: 1" = 1'-0"
Fuselage Consisted Of Rectangular Frame Built Of 4 Spruce & Ash Longerons Braced By Wooden Uprights & Crosspieces & Cross-Braced By Piano Wire. Beam Ended At Rear In Vertical Spruce Upright For Fin.
Axle Pivot Point.
Upper Half Of Fuselage "Beam"
Lower Half, Fuselage Frame.
Weyman Exhauster Venturi. Weyman Exhauster.
Fuel Pressure Relief Valve (3 P.S.I.)
Sectional Schematic Fuel & Oil Supply System.
Legend: Dashed Lines - - Oil. Solid Lines — Fuel.
Oil Circulation Indicator Vials.
Engine Air Intake Point Of Entry.
Fuel Pressure Air Pump.
Oil Pressure Supply Pump.
Fuel Spray Nozzle Or Jet.
Emergency Fuel Hand Pump.
Fuel Press. Gauge.
Pine Shaped Oil Tank (2 1/2 Gals Cap.) Under Engine Cowl To Keep Oil Fluid.
Fuel Capacity App. 6.5 Gals. Gasoline. Consumption App. 12 Gals. Per Hour. Oil Consumption, Approximately 2.4 Gals. P.H.
Fuel
The Wings Were Built On Two Pine Trapezoidal Spars On Which Were Fitted All Of The 300 M.M. Ribs. Spars Carried Fastenings Of Brace Wires & Cables & Wing Struts. Gap Was Held By Steel Compression Struts Spaced By One Rib Out Of Two.
The Whole Was Braced By Piano Wire. Leading Edges Of Both Planes Were Covered With Plywood Veneer Nailed To Front Spars. Ailerons In Lower Wings Actuated On Steel Tube Which Turned In Semi Wood Bearings Of Rear Spar And Connected Into Fuselage To Control Column.
Aileron 84 1/2" Span
Fuselage

Will it get off or not? A ½-A job banks in a stiff wind

design trends at the nationals

by BILL WINTER

PROBABLY the busiest person at the Nationals was the manufacturer interested in stunt, who interviewed every flip-flop man in sight, jotting down his findings on an elaborate table that included all dimensions and features. In 1951 he undoubtedly will have 1950's outstanding airplane! The Dallas Nationals was unique in many important respects that served more to point up future possibilities—and present ills—than the ultimate dream ships.

The jumping-off place for any design discussion must be free flight, if only because more than two-fifth of the ships entered were in those events. This startling trend may not be a trend at all, however, when you consider that the Nationals always attracts more than half of its entrants from the region in which it is held. Flat Texas and Oklahoma are great free flight areas and a controline job in Oklahoma City had already become a novelty more than a year ago. Moreover, there are four classes in free flight.

General impressions of free flight. As a quick estimate, about half the models were built from kits, or from famous magazine designs. *Civy Boys*, the Davis designs, *Powerhouses*, *Phoenix's*, *Zekes*, *Fulbars*, and so on, etc. were prominent. Much patchwork still goes on with those old Comet stand-bys, the *Zipper* and *Sailplane*, with added panels to increase area; sometimes new designs are evolved around a *Sailplane*, or modified *Sailplane* wing. Pylons are less pronounced now, probably because the original need for a large pylon area—that of providing a right-turn tendency to counteract torque—has been lessened with larger and less torque-susceptible machines. As to engines, *Spitfires* stand out in C, *Torps* in B, *Ardens* in A, and *Cubs* in 1/2A. The *Torp* is just too good an all-round engine to give way to the U-control engine (that is, engines like the *Dooling .29*). The *Cub*, being the first of the .049's, has had a year's lead over the newer *Wasp* and the *K & B .049*, both of which seemed in the tryout stage this year.

Take-offs gave little trouble, but due to excess power, fully half the flights flown were out of control or on the verge of piling in when the timer mercifully operated. To some extend this way be charged to insufficient stability, but in the main, the bigger free flights are simply uncontrollable in any dependable sense.

When Dutch Hess mentioned that Class C should be eliminated, the writer asked numerous contestants whether or not Class C could be dropped. No one said "no." Actually, Class B is equally wild, if not wilder. Johnny Brodbeck's three bags full of broken K & B engine parts from ships that had splattered on B day bears that out. While sweeping changes can't be made, it is perfectly true that the .199 airplane can be a big ship, big enough for all practical purposes.

Free flight is stuck, due to the rules. The only way to reduce the violent effects of power is to increase power loadings but this means two things: people will add wing area, making still larger machines that can't perform in the wind—if they don't, the resulting airplanes would become killers; or they would stick smaller engines in existing airplanes. Dick Everett has taken places for two years running with 300 sq. in. and an *Arden .099*. While bigger machines in relation to power are highly desirable, the present Class C, at least, stands in the

Bobby Mitchell launches a Class B ship

Most popular event was ½-A free flight—here goes another one

Red Hillegas (under white hat) looks doubtfully at PAA-Load model

Processing and weighing-in for Class C F.F. gas

way of such development. High speeds are twisting wings, bending fuselages, pulling loose hinged tails, shifting all surfaces that are not securely tied down and keyed. In winds, those slim-fuselaged jobs permit tails to rotate enough to pile-in the machine.

There is evidence that very high power can be controlled with left thrust. Joe Wagner, free flight major domo at Veco, flies 120 sq. in. on a .199 with 18° of left-thrust. It goes straight up. The K & B boys made a few tiny balsa sheet jobs with about 30 sq. in. that flew bulletlike on .035's. While this does not point the way, it does show the appalling lack of knowledge in free flight, for dozens—if not hundreds—of far more moderate designs were splashed at Dallas.

Areas vary widely. In 1949 the writer averaged all the winners at both the Nationals and the Plymouth meet and found, as an example, that the average A area was 375 sq. in. At Dallas we asked many outstanding builders how large they were designing and got such answers as 330 sq. in. in A, from Claude McCullough, and 450-500 from Ray Matthews. Since Matthews hails from that strong hold of free flight, Oklahoma City, sectional trends were checked on as well. Thereabouts it is 150-175 for 1/2A's 450-500 in A, 600-720 for .29-32 engines, and 800-950 for .49 and .51's. These latter ships are so big that the .60's are conspicuous by their absence and even the *Atwood Triumph's* are few and far between.

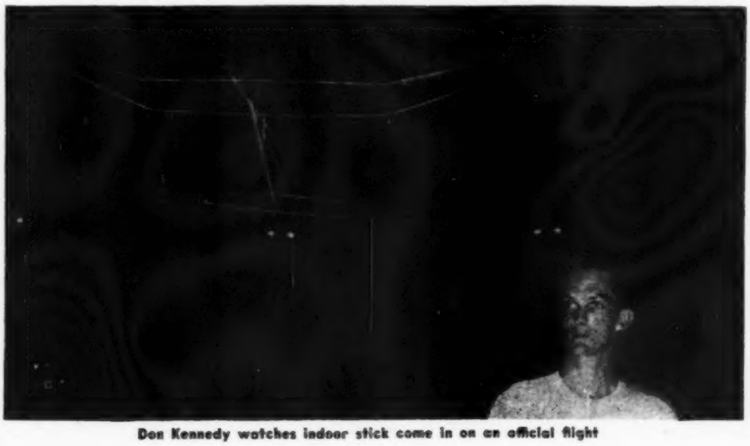
"In Class A," Ray told us, "we tried 300 sq. in. but in spite of the small wings couldn't get them as high as the larger-winged jobs, and the latter glided far better. The trend is to balance at 75 to 85% of the chord, use 40-45% of wing area tails, slimmer fuselages and lower pylons. While our ships might be classified as floaters, actual transit measurement shows we get them over 1,000' on 20 secs. motor run, without wind. I believe that larger ships are the coming thing, if drag is cut down by use of flat-section wings, cowls, spinners, and low angles-of-attack." However, we spoke to other builders who labeled insufficient decalage as the cause of spiral dives and bad stability.

In the Southeast the most popular 1/2A design features a 30" x 5-1/2" wing, a 15" x 4" stab (both of double elliptical planform, the wing only on its tip panels), and a 22-1/2" fuselage. Areas for 1/2A at Dallas seemed to run from 130 to 180 sq. in. While spark ignition held its own in 1949 on big airplanes, it was much less in evidence at Dallas. And, while wood construction is more widely used than of yore, probably due to controline influence, there was not quite so much wood per ship as last year. In stunt this past year, lighter construction meant less timbers required throughout, if there is a significance for free flight in that. About 5 oz. per square foot gives optimum performance, but since larger ships then become still larger, wing loading works out closer to 8 oz. on big jobs—about the same as for stunt!

Payload: These weight-carrying jobs now have such high performance that spiral dives and other involuntary free flight aerobatics are becoming commonplace. Ray Matthews, who makes those special Pan-American flights, like flying the watch across the Rio Grande, mail at Olathe, and an *Infant* at Dallas, carried 7.5 oz. of payload in Class A. Using half power, the duration remained the same as with less payload and full power! The answer to that one lies in the probability that *we have forgotten how to fly on a wing and fly entirely too much on the prop!*

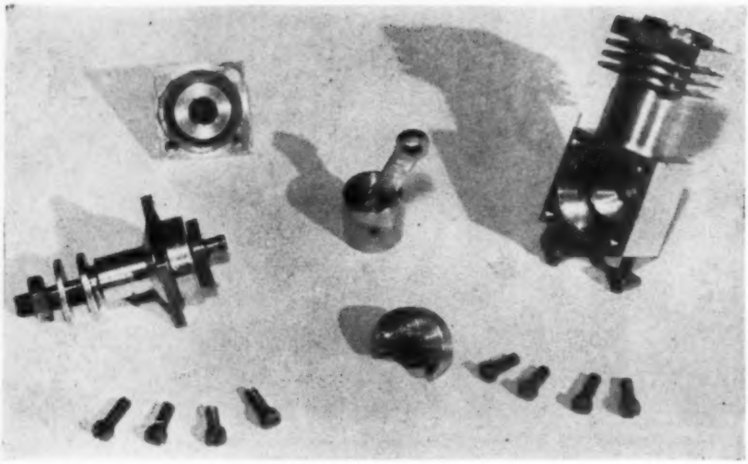
Oklahoma City probably leads the country in payload. Ray's group alone has had 21 such ships. Experiments in area from 350 to 680 sq. in. have determined 450, possibly slightly larger, to be the optimum. Ray's 444 sq. in job does 4-1/2 mins. in calm air, about 3-1/2 mins. in the wind. While lighter ships ride low-risers better and have a slower glide, the heavier ships for some reason have better climb. His winning ship has 444 sq. in., a 56" x 8" wing, a 33% stab, and an NACA 6409 wing section. It is 34-1/2" long. His new ship beats the old one and has a flat-bottomed wing of 10% thickness and 500 sq. in. area. The stab is 43%, 8% thick. High camber point of the wing is 40% back from the leading edge. Rudder area of both ships is 6%, and aspect ratio 7. It has been observed that

(*Turn to page* 39)



Don Kennedy watches indoor stick come in on an official flight

Ray Mathews adjusts his Crowbar



little dragon

part two

by ROY L. CLOUGH, JR.

Here are details for finishing, testing, and troubleshooting; let us know your results with this simple but efficient power plant

THE *Little Dragon* shapes up rapidly once the block and lower assemblies are completed. The cylinder liner is made from a length of 9/16" seamless steel tubing which has a wall thickness of about 1/16". Use great care in cutting it to size. Hold it by means of a leather strap in a vise and use a fine hack saw blade (put in the frame *backwards*). Take light strokes. The final sizing is done in the lathe three-jaw chuck. Once again please note, here is an opportunity to adjust for previous error.

The internal finish of cold drawn tubing is quite good to begin with. It can be brought to a fair running finish by means of lapping. If the builder has access to a hone, so much the better; if not, make up a brass lap and polish out the inside of the tube. This can be done easily by holding the sleeve in the three-jaw chuck, running the lathe slowly and working the lap back and forth evenly. Always run the lap into the sleeve from the same end; it is a good idea to daub a bit of red dope on this end to keep track of it. This will be the lower end of the sleeve. When the lapping has been finished, clean *all* traces of lapping compound from the liner.

At this stage of the construction it may be helpful to read over either of the two previously published engine articles, the *Simplex 25* (M. A. N. March and April, 1947,) and "*Build Your Own Diesel*" (M. A. N. May and June, 1948,) on the subject of piston and cylinder fits. This ground has been covered very thoroughly. The state of the fit, the material and degree of hardness of the piston, have great bearing upon the life of your motor, and to a lesser degree, its original performance. The best piston as far as wearing qualities are concerned is hardened and centerless-ground steel. The next best is cast iron ground on centers. Both of these methods offer difficulties to the home builder, but there is no question of their excellence. If either of these two methods is elected, there is little, if anything, the writer can add, as the *Little Dragon* piston design is about as straightforward as they come, and requires no special instructions.

If, on the other hand, the reader is anxious to get his motor running and wants a method of fitting a piston that will produce quick results, although it will not last as long, he can make up a hard aluminum piston in very short order by means of the "cold broach" method. If the internal liner surface is in good condition to begin with, aluminum pistons sometimes last for a surprisingly long time, and several commercially-produced engines have used aluminum pistons with good results.

Here is the method: chuck up a piece of 1/2" 17ST, about 3" long in the three-jaw. Do not support the tail end. Using power feed and very light cuts, bring the O.D. down so that the piece will barely fit in the lower end of the liner. Because of the length of the piece and its unsupported condition the finest cuts that can be managed will still produce a slight taper. The surface must be very bright and free of tool marks. Bore out the piston, cut it loose, and drill the wrist-pin holes. We now have the following condition: the skirt of the piston will go into the lower end of the liner about 1/8". This is backward from the way it will run. Set the liner on a block of wood, dip the piston in castor oil, set it into the liner, and making certain it is square, take a drift and drive it right through. After a couple of trips through the cylinder liner backwards, the piston can be reversed and driven through the right way. Always drive it in from the lower end of the liner and turn the piston slightly from its last position. Use plenty of castor oil and keep the piston wiped clean. After a time it will be found possible to rotate the piston without a great deal of resistance and a fairly good fit will have been established.

The conn rod is worked up from 1/8" hard dural stock. Check with the plans against what you have built, before drilling the rod holes. The piston skirt must not hit on the front case plug at bottom stroke. If you require a longer rod due to small errors, make it longer—you can take the difference out of the head. The wrist pin is simply a short length of 1/8" heavy-wall brass tube.

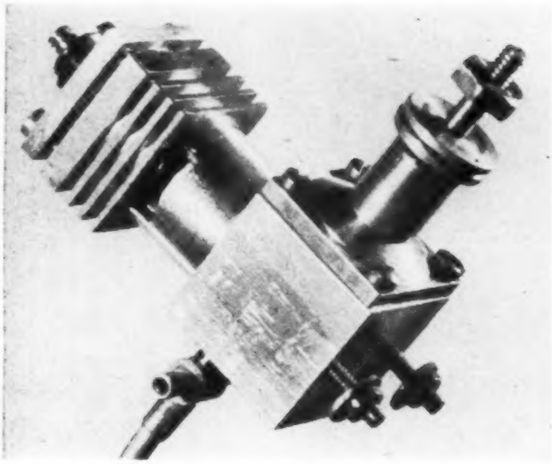
Assemble the engine, using light oil on all bearing surfaces, and turn it over by hand. The piston will (or should) have quite a bit of resistance, but no real "sticks" should develop anywhere. If they do, correct them. Check the position of the piston relative to the liner at top and bottom center. If these positions are within 1/64" of the positions shown on the plan, congratulate yourself on a job well done. If not, you will have to make allowances for the liner ports.

The exhaust port and intake by-pass are cut into the liner with a small, medium-fine file. Support the liner endwise between two thin pieces of wood in the jaws of a vise. This operation is very simple as can be seen by the plan, but care and accuracy can return big dividends here. Carefully remove any burrs that develop. The piston deflector is now filed on. Check this against both the plan and the liner. The exhaust port *must open first,* and leads the intake port by 1/32" of piston travel.

File through the barrel of the engine block below the last fin, put the liner in place and check the alignment. The block slot should be slightly larger than the liner slot, but no smaller. Take a scribe and mark the portion of the liner supporting rim below the by-pass slot, remove the liner and cut away this portion of the rim with a fine metal chisel or hand grinder. This licks the by-pass problem.

The cylinder head is of the "plug" variety and also has a slight gasket retaining groove. The combination makes it leak-proof even with very indifferent machining. Ideally, the plug should be a smooth push fit into the liner. The plug portion is extra long to facilitate final assembly. Tap a 1/4" x 32 hole into the head for the glow plug. The head is mounted the same way as the front case section, that is, drill the head holes first and use these as guides for drilling the holes in the engine block. These are tapped 2-56 all the way through the first fin.

Clean up everything, wipe castor oil on all contacting surfaces and assemble the engine except for the head. Put a prop on the shaft and turn it over a few times. There will probably be quite a bit of piston resistance, but this is all right. The thing to watch out for is jamming, though this is not likely to occur due to the general design of the engine. If it should happen, take the engine apart and look for surfaces that appear unnaturally bright, or scored-looking. Fix them up. The internal clearance between rotor, rod and crankshaft need be no more than 1/32". If the clearance is as much as 1/16 the meniscus effect will be lost on the rotor plate. This will not prevent running, but it will make starting a bit harder.



Set the head in place (without glow plug) and turn the piston up to top center, and see how much the head lifts off. Then rechuck the head and face off the plug portion enough to allow 1/32" clearance between it and the piston, at top dead center. Don't break the sharp edge of the cut—it's too handy to cut holes in gaskets with. Use it now to cut a gasket, and trim around the edges enough to allow the head screws to go through. Dip the gasket in castor oil and assemble the head to the engine. Pull the screws down "cross corner" fashion, a little at a time. They should be snug and fairly tight, but don't strip the threads out of the block.

Mount the engine on a piece of wood which can be screwed down to something solid, and put on a four- or five-inch length of fuel line. Turn the engine over by hand for a few minutes and get used to its grunts and groans. Don't put the glow plug in yet. Get to know the various wheezes and pops and what they mean. Note the soft "tunk!" made by the intake port opening into the cylinder, the gurgle of the intake rotor. These sounds are usually masked by the louder pop of released compression when the motor is flipped over.

Turn the motor over slowly several times and the intake port noise may disappear. This means the rotor has ridden off its seat. A quick flip backward reseats it. Repeat this trick with the glow plug in place (*McCoy Hot Point* plug is recommended). When the rotor unseats there will seem to be a loss of compression. Again flip the prop backwards and the "compression" reappears. Unless you are familiar with this stunt, you may think the head gasket has blown, or there is dirt under the rotor, and tear the motor down to find the "trouble."

Mix up a break-in mix of three parts *O & R No. 2* and one part castor oil. Fill the fuel line and squirt a couple of drops into the exhaust port. Hook up the wires and give it a flip. After a half dozen bursts, the parts will "find" and the motor will run out the fuel. Don't hook it up to a tank and lean it out until it has run off a few minutes of four-cycling.

The fuel you will use depends to a great extent upon the piston fit. It it is loose, more oil will be required, but if very good it can be run on straight *O & R No. 2*. Don't jump to conclusions about the compression ratio if it doesn't run correctly. Try altering the fuel mixture (oil ratio) because it may be a case of poor piston fit. If you're certain the piston fit is good, then increase the ratio by deepening the gasket groove. This engine has quite a wide range of glow C.R. because of good thermal characteristics and will operate well between 7- and 10-1, with 8 being about optimum. Once the engine is running properly don't take it apart unless absolutely necessary, as this disturbs the run-in. This is particularly true if the aluminum piston is used.

The *Little Dragon* is the result of about three months of design consideration by the writer, in an effort to obtain a layout in the ½A size which could be, quite literally, all things to all men. A basically simple construction which could return good results to the beginner, yet give the old motor hand a design which would permit him full exercise of his skill and require no apologies for the fact of being homemade. If you like it, let's hear about it. If you run into difficulties, don't hesitate to write the author. Good luck.

Glow Plug Diagnostics

SYMPTOM: Starts readily, revs up well, rpm drops off when plug wire is removed.
Indication: Compression ratio is too low.
Cure: Add oil and/or nitrate to fuel, deepen gasket groove to decrease head space.

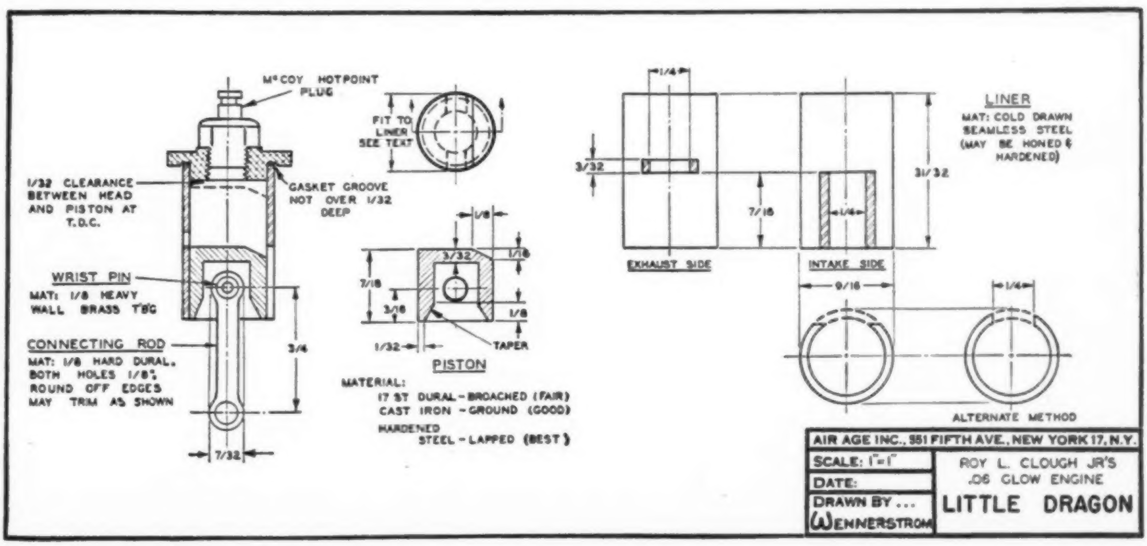
SYMPTOM: Starts very hard with much flashback, but runs well once started.
Indication: Exhaust port not opening soon enough before intake transfer.
Cure: Check liner slots against plan, file more "lead" into exhaust.

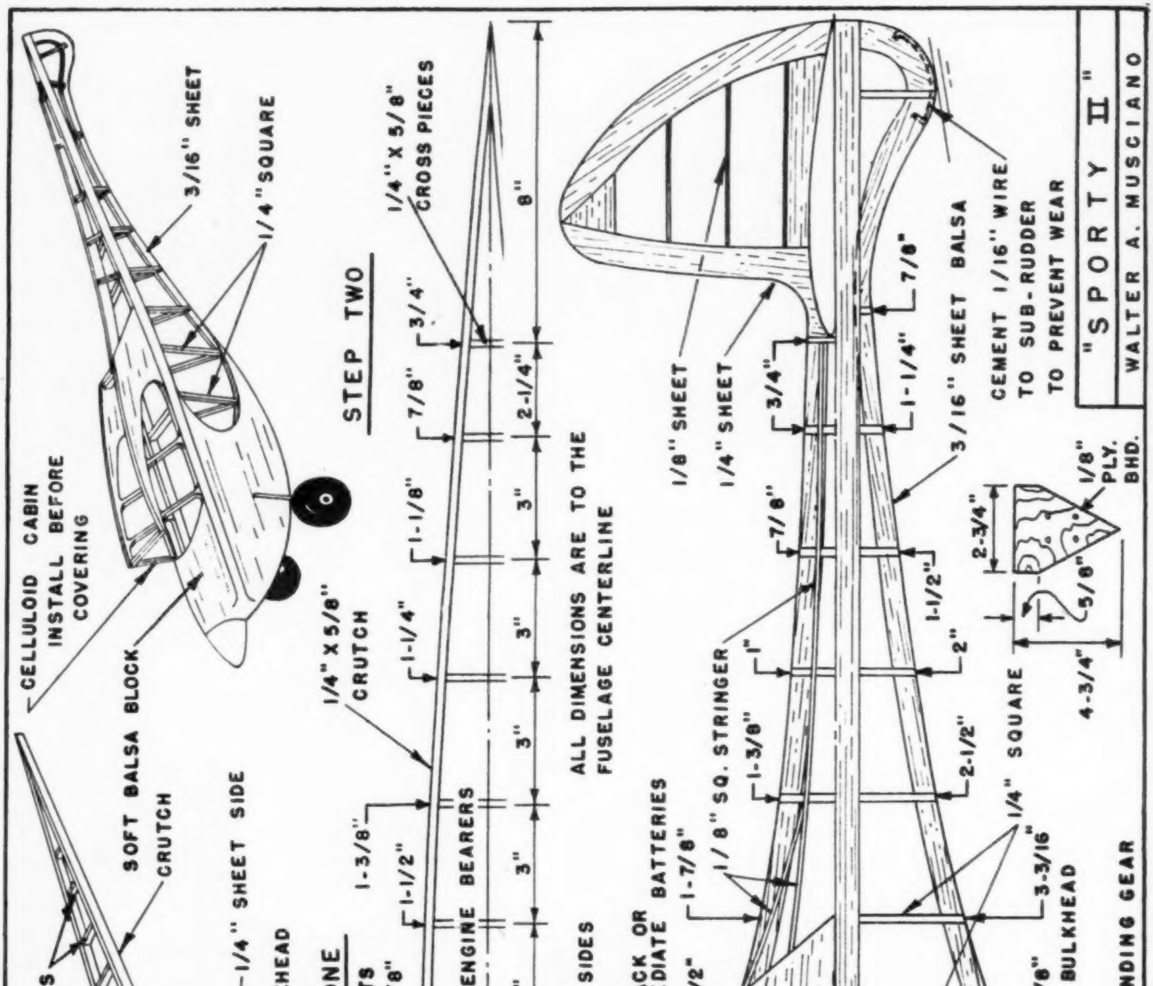
SYMPTOM: Must be flooded to start and will run only on rich mixture.
Indication: Cylinder head, or glow plug gasket is leaking.
Cure: Replace gaskets, check surfaces for damage.

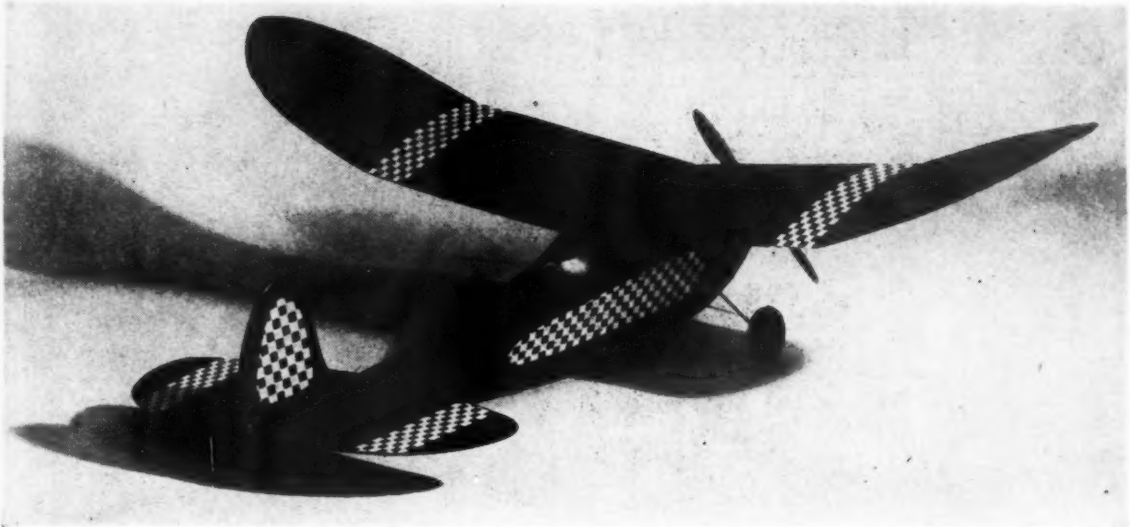
SYMPTOM: Kicks violently, runs in short high speed bursts, kicks off prop, stops suddenly.
Indication: Compression ratio is too high.
Cure: Reduce compression ratio by shaving down inserted "plug" portion of cylinder head, or try high compression fuels with a cold glow plug.

SYMPTOM: Starts easily, holds up speed when wire is removed, leans out well, then gradually dies out.
Indication: Motor is not yet broken-in, probably overheating.
Cure: Use heavy, low pitch prop and run motor as rich as it will take for ten to fifteen minutes, then try it again.

General: Watch for the usual bugs, clogged fuel line or needle, tanks not vented correctly, loose prop, bad plug, loose wires, insecure mounting, evaporation weakened fuel. Use a port prime to start engine.




"SPORTY II"
WALTER A. MUSCIANO
STEP ONE
STEP TWO
ALL DIMENSIONS ARE TO THE FUSELAGE CENTERLINE
1/4" SHEET BALSA SIDE
1/2" GRID
ENGINE BEARERS
ENGINE MOUNTS
CROSS PIECES
SOFT BALSA BLOCK
CRUTCH
1/4" SHEET SIDE
BULKHEAD
CELLULOID CABIN INSTALL BEFORE COVERING
3/16" SHEET
1/4" SQUARE
PLASTIC SPINNER
5/8" X 5/8" HARDWOOD MOUNTS
1/4" X 5/8" HARDWOOD ENGINE BEARERS
1/4" X 5/8" CRUTCH
1/4" X 5/8" CROSS PIECES
MEDIUM HARD 1/4" SHEET SIDES
USE POWER PACK OR INTERMEDIATE BATTERIES
12" DIA. 8" PITCH PROPELLER
BALSA BLOCK SOFT
SPLICE
1/8" SQ. STRINGER
1/8" SHEET
1/4" SHEET
3/16" SHEET BALSA
CEMENT 1/16" WIRE TO SUB-RUDDER TO PREVENT WEAR
1/8" PLY. BHD.
1/4" SQUARE
1/8" PLYWOOD BULKHEAD
1/8" DIA. WIRE LANDING GEAR
ENGINES FROM .29 TO .49"
3" AIR WHEEL
4-3/8" 2-1/4" 2-5/8" 2-5/8" 3" 3" 3" 3" 3" 2-1/4" 8"
1-5/8" 1-5/8" 1-1/2" 1-3/8" 1-1/4" 1-1/8" 7/8" 3/4"
3" 2-1/2" 1-7/8" 1-3/8" 1" 7/8" 3/4" 7/8"
4-5/8" 4-1/8" 3-3/16" 2-1/2" 2" 1-1/2" 1-1/4"
2-3/4" 5/8" 4-3/4"



sporty

by WALTER A. MUSCIANO

DESIGNED strictly for stable, realistic flying, *Sporty* surprised everyone, including the author, by performing better than the average pylon job because of the well-balanced force arrangement. The prototype won a first-place trophy with a flight of over 17 mins. O.O.S.; another model of the same design won three medals and an engine. This was back in 1940. In climbing, the nose does not point skyward as on most designs, but the model certainly gains altitude in a hurry. There is no appreciable dip when the engine stops, partially due to the comparatively short tail moment-arm. Center of lateral area is low, affording excellent spiral stability, while the thrust line is high to prevent excessive nose-up moments and consequent looping under high power. The airfoil was designed especially for models and is neither extremely high nor low speed. An inverted *Tiger-Aero* engine was used on the original model and this was lost O.O.S. A second ship was built using an upright *Mighty-Midget* which performed with equal success, but was recovered. The design is stable enough to handle the power of a .60 cu. in. engine and a light model should perform well with a .30 cu. in. power plant. Our latest version is glow-plug powered, with an *Ohlsson .29* up front and performance is better than ever.

Plans are one-fourth full size and therefore must be enlarged four times. Incidentally, by enlarging the plans only twice you will have a swell ½A performer of 165 sq. in., which could use engines like the K&B *Infant*, or the *Cub .049*.

General dimensions for the design are: wingspan 65", wing area 600 sq. in., length 39", aspect ratio 6 to 1, stabilizer area 209 sq. in.

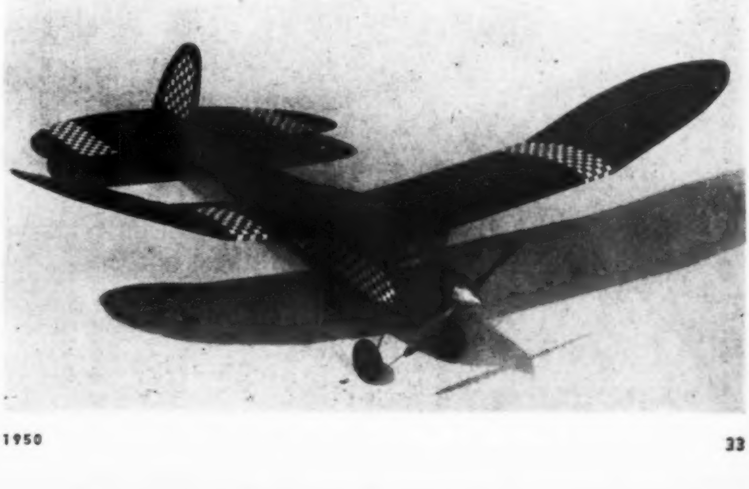
Fuselage construction is simple, durable and does not require intricate bending of longerons. A conventional "crutch" is constructed using hard balsa. The 1/4" x 5/8" engine bearers are spliced onto the crutch before assembly. These are made of hardwood and serve as a foundation for the engine mounts which are cemented to it. While this is drying, the bulkhead and 1/4" sheet balsa fuselage sides are cut out. After the landing gear is bolted to the bulkhead, these units may be assembled as shown in step one. The 3/16" sheet balsa longerons are now cut and cemented in place, to be followed by the 1/4" square uprights to complete the diamond shape. A nose block of soft balsa on the upper and lower portion of the hardwood bearers not only streamlines the plane but also adds much strength. The cabin is covered with rather heavy celluloid as this also adds to the strength of the ship. A thorough sanding should be given the fuselage before covering with heavy *Silkspan* or *Sky-sail*.

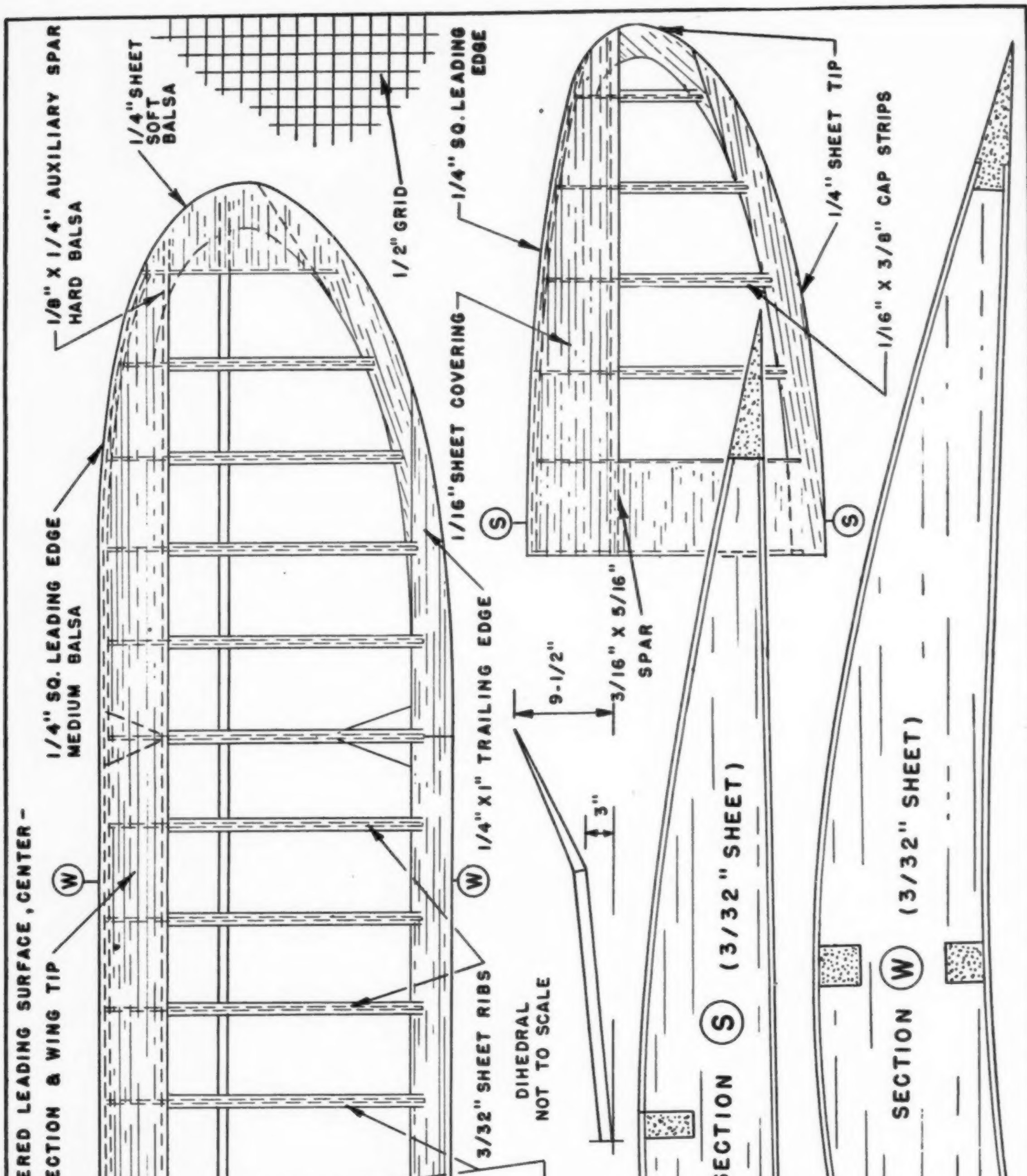
The stabilizer is quite conventional, utilizing a lifting type of airfoil, and the fin is symmetrical in cross section. Stabilizer ribs are 2-1/2" apart. Both are easy to construct and require no further description except that the stabilizer is cap stripped on both top and bottom. Cap stripping adds strength to the ribs and also reduces the covering sag between ribs, thereby increasing the airfoil efficiency.

Instead of the more conventional monospar wing, two main spars were used in conjunction with an auxiliary spar. The 1/4" square hard main spars are assembled using joiners made from hard balsa 1/4" sheet, 9/16" high and cut to the correct dihedral. When dry, the ribs are inserted horizontally between the spars and twisted upright so the spars fit in the rib notches. Spacing between ribs is 2-1/2". The leading and trailing edges, auxiliary spar and sheet tip are now added. Only after the leading edge covering is attached are the cap strips cemented in place on both top and bottom. It will be noted that the trailing edge of the wing and stabilizer are notched 3/8" x 3/8" x 1/16" deep, to accommodate the cap stripping. The center section covering is on the top only. After sanding this assembly, it can be covered with heavy *Silkspan*, *Sky-sail* or double covered with tissue, cross-grained.

The engine mounts are lightly cemented to the bearers so they will separate in the event of a serious crash thereby preventing damage to the engine or model. Dope the cowl interior before installing the engine. Fuelproof also if required.

All surfaces received four coats of clear dope and two thin coats of pigmented dope. Colored dope was used in spite of the many claims that it adds unnecessary weight. The author has found that the additional few ounces of additional weight is compensated by the finer appearance, durability, (*Turn to page 57*)




1/16" SHEET BALSA COVERED LEADING SURFACE, CENTER-SECTION & WING TIP
1/8" X 1/4" AUXILIARY SPAR HARD BALSA
1/4" SHEET SOFT BALSA
1/2" GRID
1/4" SQ. LEADING EDGE MEDIUM BALSA
1/16" SHEET COVERING
1/4" X 1" TRAILING EDGE
3/32" SHEET RIBS
1/4" SQ. SPARS VERY HARD BALSA
1/8" SHEET GUSSET
1/16" X 3/8" CAP STRIPS
SPACE ALL RIBS 2-1/2" APART
AIRFOILS FULL SIZE
W
W
1/4" SQ. LEADING EDGE
1/4" SHEET TIP
1/4" SHEET COVERING
1/16" X 3/8" CAP STRIPS
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DIHEDRAL NOT TO SCALE
SECTION S (3/32" SHEET)
SECTION W (3/32" SHEET)

ENGINE REVIEW

"Spitzy"

by LEE SCOTT

What about the new *Spitzy*? It's almost *too* good to learn that a miniature engine with tank, glow plug, combination (positive and negative) glow plug clip, 6" diameter propeller, prop wrench, and mounting bolts, can be sold for a really low price. Let us look into it, and test a couple.

Spitzy Specifications:

Class—½A
Type—Two-port, two-stroke cycle, air-cooled
Fuel Admission—Rotary crankshaft valve
Carburetor—Downdraft spray bar, suction-type
Ignition—Glow plug
Bore—.375
Stroke—.4062"
Piston Displacement—.045 cu. in.
Engine Rotation—Counterclockwise
Engine Weight—1 oz. (Approximately)
Radial Mounting—Four No. 3 screws
Recommended Propellers—*Baby Spitfire* 6" diameter, 2" pitch for free flight, and a 5" diameter by 3" to 4" pitch for U-control

Every new engine is a new experience for the model hobbyist. Each engine needs experimentation to find the easiest starting method and the proper needle valve setting. The manufacturer has conducted many tests to assure easy starting; the results of these tests are placed in the instruction sheet and therefore it should be read over two or three times.

It is always wise to use only the fuels recommended in the instruction sheet by the manufacturer. In the tests conducted for this article, *Ohlsson & Rice 30* fuel was used very satisfactorily. An eye dropper, with a three-inch extension of rubber tubing placed on the end, was used to fill the *Spitzy* fuel tank. The tank must be filled before the fuel line is attached to the tank. The fuel line is removed from the tank and replaced each time the tank is filled; this is the only undesirable feature we found in operating the engine.

The needle valve was opened six to eight turns counterclockwise. This setting varied slightly with each engine tested. Before starting, two drops of fuel should be dropped into the intake tube and a small amount injected into the exhaust port, while the piston is at the bottom of its stroke. Turn the prop over slowly several times. This will assure proper lubrication of the crankshaft and piston.

The *Spitfire* glow plug furnished with the engine worked perfectly, and the combination glow plug clip was very handy. Although other glow plugs can be used to operate the *Spitzy*, the combination clip will not fit other plugs.

To be sure that fuel will flow from the tank, place a finger tip over the air intake tube and rotate the propeller until the transparent fuel line is full. Inject a little more fuel in the exhaust port and connect the clip from the batteries to the glow plug. With the piston at the bottom of the stroke, the glow from the plug can be seen reflected on the top of the piston. If this reflection is not seen, check the batteries, wiring, or plug.

The first engine started up very quickly after spinning the prop only twenty or thirty times. The needle valve was open eight turns, but the engine revved-up best when the valve was closed to seven and one-half turns. The batteries were of course disconnected after the engine started. The engine turned over between 11,000 rpm and 12,000 rpm with the 6" diameter by 2" pitch free flight prop furnished with the *Spitzy* Engine Package. The average run was approximately 1-1/2 mins. on a full tank of fuel. This is ample time for the average flight.

The second engine seemed to be a little tight and consequently a little harder to start. A small flywheel placed on this engine enabled us to start it in a hurry. After a break-in run of 10 to 15 mins., using the flywheel, the engine started easily with a propeller. Occasionally among new engines, one will be found that is tight and a little more difficult to start, at first. This is definitely not a detriment. It is much better to have an engine that is a little tight when new. A flywheel, or metal prop-spinner, always makes these new engines easier to start.

It is difficult to believe that the engines of today, selling for less than half the price, are actually much better than prewar engines. It is interesting to know why. The prices on everything else have gone up, due to the increase in labor costs. One of the major factors that determines the retail price of any engine is labor, and the cost of labor has also increased in the miniature engine idustry, but the amount of labor required to produce miniature engines on a large scale has been greatly reduced.

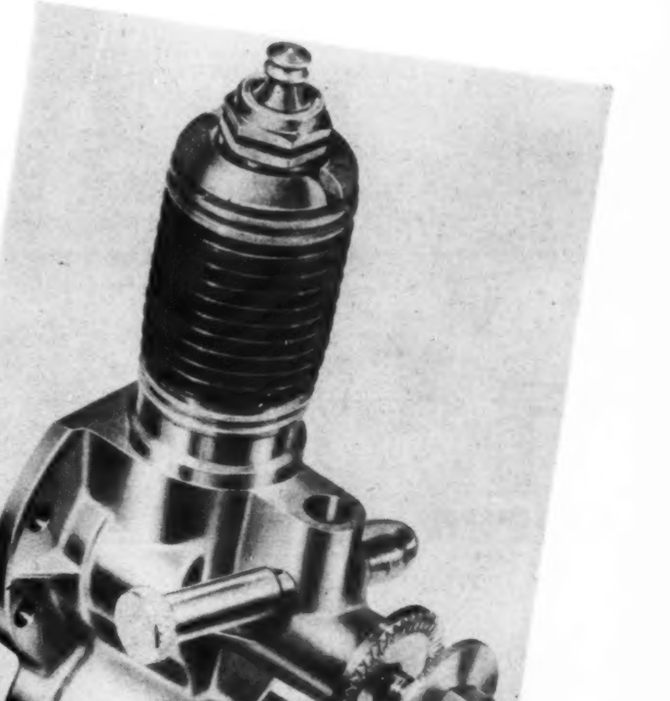
This is due to new developments, new designs, new methods of mass production, and the use of high-speed machines, that during World World II turned out precision aircraft parts in great quantities.

Automatic screw machines can turn out cylinder-heads, cylinder barrels, back plates, pistons, needle valves, and various other engine parts very rapidly. Long rods of solid metal or bar stock are fed automatically into one end of the machine, and a series of gears, levers, and cams operate the cutting tools which shape each part. This machine may complete seven or more operations before the finished part drops into a box. Tolerances on some of the engines of today are actually held closer than the tolerances on custom-built prewar engines that were "hand made." You've perhaps heard the saying, "Jack of all trades, but master of none." That is not so with the operators of these automatic machines; they have spent years operating one machine, of which they are truly the master.

The development of the glow plug alone has made engines much cheaper to manufacture, by completely eliminating the ignition system. Most ignition systems require at least ten or more parts, not to mention the additional cost of condensers, coils, batteries, a battery box, and wiring. Spark plugs alone sold for 85c, where today glow plugs are only 49c.

Don't be skeptical about the low price of modern engines—it doesn't necessarily mean that the engine is made of poor materials, or that the quality of workmanship is bad.

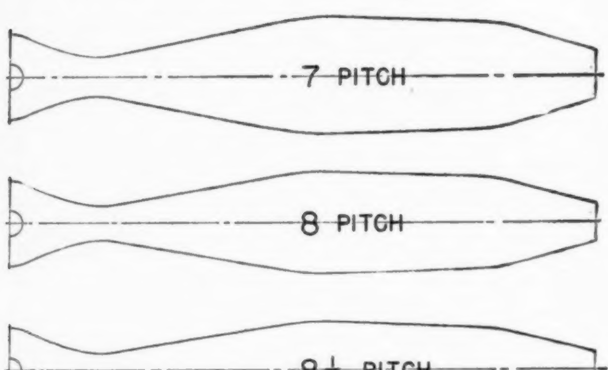
(*Turn to page 62*)



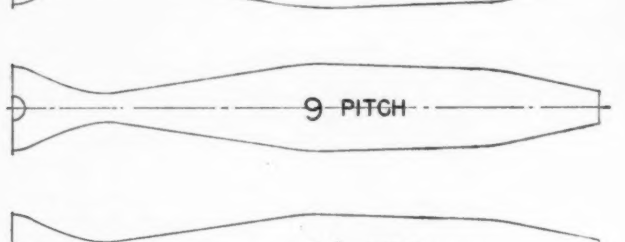
R. P. M.

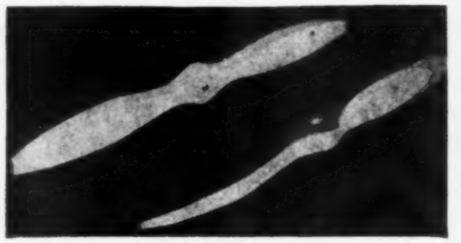
by J. L. McLARTY

PROPELLER TEMPLATES - TOP



PITCH SELECTION CHART





At top in above view is finished prop blank, while partially carved blank is under it. Tip shape is marked out

Here's the tailored speed prop ready to do business for you

WE HAVE a brand-new speed model—the engine runs, in fact everything works well—but do we know what propeller to use? The plane will fly on anything from 8" to 12" in diameter, from 6" to 16" pitch; however, only one combination of pitch and diameter will make it go the fastest possible. Almost the same dilemma confronts us with our stunt model. Certainly, it is easy to see what the other fellow uses, and then buy a prop that will fly our own model. But the chances are all against us gaining top-notch performance if we follow this procedure.

One-bladed propellers are coming into prominence. They weigh a little more and their balance has to be checked continually but they do deliver more thrust from the engine. The main reason for increased thrust is the larger disc area of the propeller since a single-blade should have a larger diameter than a two-bladed prop. Also because the single-blade is larger, a more efficient section and stronger blade is possible.

The purpose of the article is to suggest a method of arriving at the best propeller for any U-control model, and to show you how to rework a "store propeller" or carve your own single- or two-bladed prop.

The chart given with this article is for determining propeller pitch. Aside from this pitch, each element of the blade must be given an angle-of-attack. On the propeller patterns given, this angle-of-attack has been added. That is, each part of the blade has been given an added 3° angle which will allow the entire blade to work with the best lift and a minimum of drag.

To use the chart, it is first necessary to know at what rpm your engine develops its maximum

Few modelers carve their own speed or stunt propellers—they just purchase a size they hope is correct. But top performance requires an exact match between engine, prop and plane

power. If necessary, write the manufacturer for this information. The other thing we have to know is the speed at which we wish the model to fly. If the model has been flown, a speed can be picked 5 or 10% higher than the previous figure. It would be wise in any event not to be too optimistic but to use speeds attained with stock propellers as a guide.

Let us take an example: suppose we have a *Forster 29*, and are going to use glow plug. Maximum horsepower is developed at 13,400 rpm. On the chart we pick a point between the 12,000 and 14,000 on the bottom "rpm" lines and draw a line parallel to the other "rpm" lines.

We have flown this model with several stock propellers, and our best time has been 90 mph. We want to try for 100 mph, so will design our propeller accordingly. On the chart follow the "100" line on the mph until it crosses the "rpm" line. This gives us a pitch slightly under 8" (and we have been flying with 12" pitch!). Now here is the important point; regardless of whether or not you buy props or make your own, above all *use only* 8" pitch propellers, no other pitch.

The next procedure, whether you have bought or made your prop, is to obtain approximately the diameter which will allow your engine to turn at its best rpm. This can be accomplished by using one of the various tachometers on the market and having the engine run 2,000 or 3,000 rpm slower (on the ground) than the rpm you are striking for. When trimming the propeller, do not trim any part but the very tip, and then only by taking off 1/16" per tip each time. The diameter of the tip is cut down until a flight test shows that the plane has traveled more slowly than it did on the previous flight. In other words, you have cut too much off the prop tips. It is an easy matter to cement such small pieces on again.

The only remaining refinement is to begin again with the same pitch propeller, but this time leave it 1/8", 3/16", or 1/4" larger in diameter and make the blade width 1/16" less. Then trim as before until maximum speed is obtained.

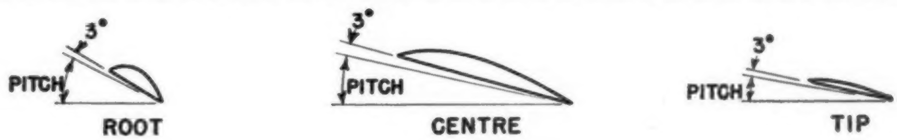
If you have a two-bladed propeller and wish to use a one-bladed propeller with the same or better performance, here is what you should do: the single-bladed propeller should be 1-1/4 (1.26) times as large as one blade of the two-bladed prop it replaces. The pitch remains the same, but the diameter and blade width should both be 1-1/4 times as large. If you have a 10" diameter, 8" pitch two-bladed prop and wish to replace it, the single blade should be 10 x 1-1/4 inches in diameter. That is, the blade should be 6-1/4" long from the center, instead of the 5" length of each of the blades on the two-bladed propeller. Commercial props can easily be used to make single-bladed props, by following this scheme. Of course, a well attached weight and careful balance are most important.

Since most machine-cut propellers vary a little, it is not possible for them to give the performance that may be had from an accurately hand-shaped propeller. Included in this article are templates and instructions to enable you to carve your own with great accuracy. You may have these enlarged or reduced by photostat to match any size prop you wish to produce.

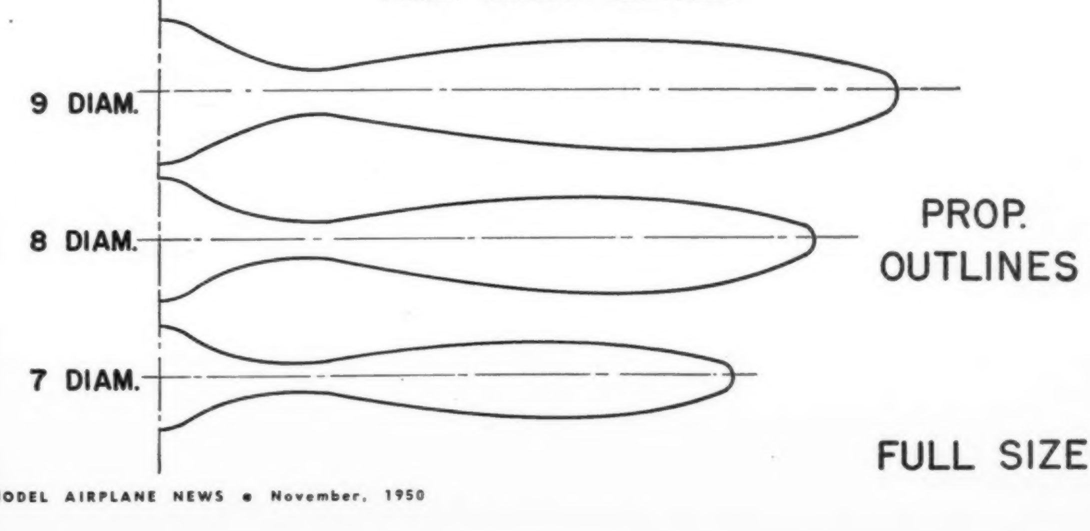
It is assumed that you have calculated the pitch you should use and the approximate diameter. Obtain birch, lemon wood, or similar stock which has been properly aged. Cabinet makers are a good source. If possible, get your blocks cut squarely on a circular saw. Accurately trace the top pattern onto the wood. Cut to outline and recheck with the pattern. The wood shape should follow the line of the pattern so that no part of it falls inside or outside the pattern. This is important. Next use the side pattern of the pitch you have chosen and transfer it to the block. Again, after cutting this and sanding, check with the pattern in the same manner. Your accuracy at this point is also important. Your work should now resemble the upper block in the photo.

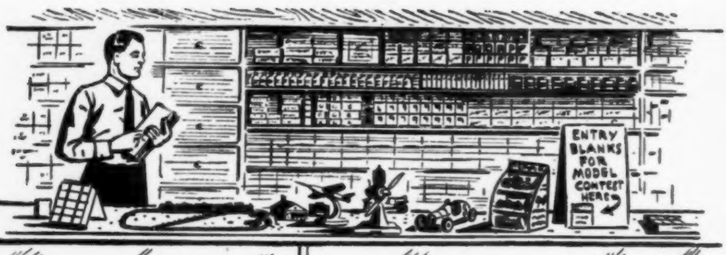
Next carve the undersurface of your blade(s) as shown by the lower block in this photo. The surface should be flat and should exactly meet each corner as illustrated. When you have arrived at this point, the difficult part is over. On the blade(s) carved, draw a conventional propeller outline and trim to this shape. Next carve the top surface. The thickness of the blade(s) will depend upon the wood and in what manner the propeller is to be used. For instance, the blades can be thin if you use a motor starter; thicker blades will make hand-starting easier. Finish smoothly with a section similar to that shown. Balance both the two-bladed and single-bladed propellers with the greatest of care.

After your model has flown well, with no bugs, and you have some spare time, use it to try a "true pitch" propeller.



PROP. CROSS-SECTIONS





HOBBY COUNTER

Conducted by THE TRADE OBSERVER

HAVE you seen Berkeley's (142 Greenpoint Ave., Brooklyn, N.Y.) *Mini Hogan 34* and *45*? We don't mean in the ads—we mean "in the flesh." If you haven't, drop in and examine these kits, for they are free flight collector's items. At $2.95, both these kits are Denny Davis designs; plans are by ex-national champ Hank Struck, an extraordinary combination if there ever was one. The *Mini Hogan* is a high performance pylon ship, striking a nice balance between skill in construction and easy-to-assemble design. The *45* features a parachute dethermalizer, operated by a timer, fuel shut-off device, and is powered by .074's through .09's; the *34* uses a coil of fuel-line tubing as an engine-run timer and an *Elmic* timer for a "pop-down" stabilizer dethermalizer. While built-up construction is employed, edges are shaped and notched, sheet parts are die-cut. Take a tip, the *Mini Hogans* have everything if you want a go at free flight. I suggest the beginner or sport fan select the smaller engines mentioned; these ships really go high!

* * *

Looking for Christmas presents? This year's crop of ready-to-fly models offer some extraordinary buys. Ideal for you, your younger brother or friends. Two facts you should know: these things really work, and every engine that gets into a new fellow's hands, via the ready-to-fly route, makes him a potential model airplane booster who'll be back for more advanced kits and engines on his own.

First, there is the *Firebaby*, put out by Jim Walker's A-J Aircraft Co. (1166 N.E. 31st Ave., Portland, Oregon), for $2.50 less engine, or $7.50 with. This clever job has everything a big U-control model has, only it slides out of the box ready to go. The completeness of its engineering and production design is staggering. Printed in two colors, it is fully fuel-proofed, has a plastic bubble canopy that holds a cute little balloon tank. Jim's novel "slow-motion" prop makes it practical for the beginner to learn to fly.

Second, Allyn Sales Co., (6425 McKinley Ave., Los Angeles, Calif.) has an all-plastic gas-powered, round-the-pylon version of a *Douglas Sky Raider* that is a real knockout. One thing in its favor is the very fact that it is round-the-pylon for, as it is working out, the small fry, ten and eleven year olds, are (thanks to Mom and Dad!) going for this number in a big way and there hasn't been a complaint heard in my shop so far. One chap flies his so much for the neighbors and his friends that the old man rigged lights in the backyard!

In deep blue plastic—the true color of those Navy jobs—the Allyn Sales *Sky Raider* is attractively packaged, consisting of the fuselage and top of wings unit, wing bottoms, fuselage bottom (all speedily cemented together); landing gear unit consisting of formed wire with wheels in place, small wedge tank, propeller, simple plexiglas firewall and motor mount, *K & B .035* engine, even the *K & B* booster battery leads and *Slip-On* connector. Including engine, price is $8.95. The illustrated directions are excellent.

Third, by Mack Brothers Mfg. Co. (3617 Hayden Ave., Culver City, Calif.) is a somewhat larger, all plastic *Wen-Mac Aeronite*, a U-control, *Spitfire*-powered model that sells with engine for $9.95. This, too, is an impressive job of engineering and packaging that would have been deemed impossible two years ago. There is a top and bottom shell (including the wing which is split along the edges), which assemble with two screws. The Walker-type control system is in place, and bellcrank and elevators are operable as they come from the box. Both shells key together for positive accurate alignment. Absolutely complete, even to booster connector, prop with spinner, handle with lines.

Any modeler should look over these ready-to-fly airplanes; the ideas involved, the execution of detail, the entire deal, is breathtaking.

* * *

In rounding out their series of *Speedee-Bilts* to an even dozen, Monogram Models, Inc. (225 N. Racine Ave., Chicago, Ill.), has added some features you'll be interested in, but have not upped the price from the original $.75. The three new numbers are the *Hellcat*, the *Navion*, and the Republic *Thunderjet*, all of which you've seen in the ads. But each of the three new numbers include a plastic pilot, military for the fighters and civilian for the *Navion*, as well as plastic bombs, plastic cowls, exhaust rings, and new detailed canopies.

Speaking of pilots, all control-line fans—in particular, team racing adherents—will get a charge out of the 1/10th scale Team Racing Pilot by Development Engineering Co. (Box 691, Hagerstown, Md.) This pilot is made from flesh-colored flexible plastic (not unlike rubber in feel), is very light, and unbreakable. You color the pilot to suit, using hot fuel-proof dope—regular dope stays tacky. To mount, cut a plate from 1/8" sheet balsa (template provided) and glue this to plane structure. The pilot is stretched down over this plate and remains in place by friction. The idea is that you can move the pilot from ship to ship. Sells for 50c. This firm also has under development a revolutionary Universal Two-Speed unit for glo engines.

* * *

If you live near water a really practical item and a barrel of fun, too, is the *Viper Air Boat*, by North American Model Products (Newport News, Va.). It has a rather thinnish hull assembled from pre-shaped balsa blocks, with (what's the proper nautical term?) sponsons, ala speed boat practice, at the bow. The gas engine—*Spits*, *Cubs*, or the *Infants*—mounts in a nacelle with air propeller pulling tractor-fashion. Hardware is complete and most considerate of the builder's problems, as special spacers are provided for mounting some of the engines involved. The *Viper* goes like crazy round the pylon, or you can sit yourself in a row boat with a short line. Turned loose,

(*Turn to page 52*)

Design trends at the nationals

(*Continued from page 29*)

the flat-bottomed wing gives better glide, a trifle faster but with less sinking speed. Both balance at about 75-85% of chord.

For Class B pay load, the best combination seems to be 700 sq. in., with something like a *Torp 29*. In Class A pay load, due to added weight, the best prop has 1" less diameter than standard; a 9-4 *Top Flite Arden*, or a 10-3½ with one inch off tips works well. With an 11-4 *Top Flite*, the .29 turns 12,400 on a dry day at 75° (by strobotac). Best angle-of-climb for payloads is about 45%. Steeper than that and the prop has to lift too much of the weight.

Radio Control. Two major developments were the winning of the Nationals in R.C. by Gene Foxworthy, using the Macnabb *Citizenship* radio, which requires no license, and the appearance of the "beep-box." The author flew one of Foxworthy's designs one evening and can vouch for its extreme stability, tight turns without loss of altitude, and excellent response. It features twin rudders to place those movable surfaces outside the slipstream, to give equal control power-on or power-off; it is fitted with letter-box wing slots. When these slots are taped over this machine will fly level, but with the slots open a climb results. Foxworthy's airplane is an ideal sport plane, plenty good enough to win many smaller contests but not suited—so thought Gene—for winning the Nationals. Despite an inherent inability to spin it defeated machines that could, and which, consequently, could do stalls. The difference lay in the winds which interfered with radio, stunt, and free flight. For most of the week, radio jobs were unable to make their quarter-mile cross country and many of them ended up a half-mile downwind. Machines that can bore through the wind are badly needed.

The "beep-box" is the ground control handle (shown in Walt Good's article on the *Rudder-Bug* [May-June, 1950, M.A.N.]) which apparently was designed originally to enable fast controlling without mental confusion. As it works out, this gismo allows the use of more powerful rudder which can be applied as often as necessary during a single turn. Held for an appreciable time, the turn will develop into a spin. This allows ordinary maneuvering, plus emergency rudder which should permit chandelles, lazy eights, and many other maneuvers. Since this gadget is used on rudder-only systems with single-channel radio, rudder has turned out to have far greater possibilities than previously supposed.

Various styles of control boxes made their appearance. Colby Evatt had a push button mounted on the control box, in addition to his rudder position control, which could be used to get the "control stick" back into sequence if for any reason an escapement skipped or a signal was missed. His ships featured a simple two-speed control for glow engines, consisting of two needle valves and feed lines, plus a butterfly. As far as ships are concerned, the trend is to use magazine designs—special kit designs not having appeared on the market—such as the *Rudder Bug* (overwhelmingly popular) and the *Radart*. Five-and-one-half feet to six feet is a satisfactory size with a .29 for power. A good all-round wing loading would be 16 oz. per square foot. Most present ships have too light a loading for flight under windy conditions.

For the first time, R. C. ships were being flown on four separate frequencies, though not at the same time. Later tests will show if the frequencies used conflict at all; if not, future Nationals (and other large radio control meets) may see the use of several frequencies at once—that is, several contestants will have their ships in the air on official flights at the same time. It will have to be this way if the rapidly-growing number of R. C. contestants is to be accommodated.

Stunt. Stunt seems to have settled down, areas running between 500 and 700 sq. in. with anything from a .29 on up. It was noted, however, that wind played havoc with these airplanes. Virtually unbeatable in a calm or even in a moderate breeze, they put a burden on the pilot in a strong wind. We observed many of the country's most famous designers pile them in. How much wind affects stunt was evident when Leon Shulman, who had a beautiful large-area ship in the car, flew a much smaller one with a *Torp*. While it was so fast that the square loops were mighty shaggy, Leon placed fourth. Should you have two stunters, one for windy weather, the other for good conditions?

DeBolt, who took a third in that event, remarked that for a good all-round ship, the power must be a .60, if it is to be flown under all conditions. Watching DeBolt, pipe in mouth, flying in that gale, we were convinced he wasn't having too bad a time of it; at least he had no hairbreadth escapes from the concrete. Palmer, who placed a notch higher, well deserves his nickname of "Smoothie." But a gust slapped *his* job onto the concrete so quickly that it could not be saved by any degree of piloting skill. Both Andrews and Palmer, first and second in Open, had airplanes distinguished for their finish, each rating nine out of the ten points for workmanship.

The trend this year was away from the big engine, though the resulting planes are at a disadvantage in bad weather. But it is not possible to say that everyone is building lightly-loaded barn doors. One school of thought from Detroit, represented by Bob Dailey, who took a first last year, favors a more compact, smaller machine, but with a very thick airfoil of some 20%. Presumably the added drag has the effect of holding down speed, even with the heavier loading. Any factor that contributes lift will oppose the build-up of wing loading in abrupt maneuvers, which (evident in mushes) produce high-speed stalls.

Here, too, rules are a factor. In many

sections there are reports that too many fliers can do perfect maneuvers according to present rules. One hears arguments that some means should be developed to determine what constitutes a perfect maneuver, thus spreading the points wider apart, and making the winner really stand out.

Speed. H. A. Thomas, one of the Little Rock team, pointed out that it was easily proved that there has been little change in two years. Grish, in beating Tom Jones, of Little Rock, Arkansas, by a fat 13 mph with his Class B *White Fawn*, duplicated his flight of two years ago. Since he did 137 mph with the heavier lines it is likely that some progress has been made in fuels, tanks, etc. The *White Fawn* is BIG. DeBolt, who tried a smaller-than-ever A job saw his speed fall away from his past Nationals performance. Grish did have a constant pressure tank, though not fully sealed as in the DeBolt and Newburger setups. His fuel pressure was stabilized enough to get around the rich-lean variation, particularly noticeable in windy weather as at Dallas. Grish used a standard 7-9 *Tornado* prop. Schute, whose name is often seen on the record lists, used balloon tanks rather successfully. Standout was the performance put up by Friedland, Mark Brown, and Stiles. Friedland hit 147, which was tops. Their jobs look like Mahieu's—they are longish with thin blade props.

The Little Rock crowd sacrificed smooth lines for reduced frontal area in their newest metal-bottomed jobs. But one of their older and fatter wood jobs keeps right up with the newcomers. Metal has many advantages, in their opinion; no coming unglued, no oil soaking, and you can bend them back to shape after hard landings. A few have become crystallized at critical points, however, so it may be a toss-up.

Over the last two years, the job that once took a .29 now takes the .49, and the .49 ship carries a .60. The .19 is used in the previous .29 jobs. Little Rock still uses flat-bottomed wings of 9% thickness but with slightly more upturn near the leading edge, compensated for by more positive in the stab. They also use stock fuels and props, though Doc Warden prescribes a little oil or nitro after listening to the patient. On their small models, paddle-blade props are giving best results.

In general, the boys who were doing the real moving seemed to have their own ideas on the brew that went into the tank. One expert noted a number of cases where the nitro content was on the upgrade. Many entrants used stock *Tornado* props or *Rev-Ups*, reworked slightly. A trend to lower pitches was noticeable, probably due to the increased drag of the larger lines. As a rough approximation of specifications through all classes, the following table may be interesting: Class A—25 sq. in. area, 9 oz. weight, 1-1/4" diameter spinner; Class B—35 area, 14 oz. weight, 1-3/8" spinner; Class C—40, 24, and 1-1/2"; Class D—45, 26, and 1-3/4".

Harold DeBolt, asked to fill in with some background information, pointed out that construction is the single factor where there is still wide variation.

"Everyone seems to realize the importance of reducing cross sectional area," stated Harold, "and there are all sorts of attempts to accomplish this. Where the boys have paved runways to fly from, they have removed the engine lugs and are using a sheet metal fuselage bottom with radial mounting. This makes the fuselage about 1/16" thick where it goes by the engine. A nice narrow job, but a weak one.

"But the majority are flying from fairly rough ground and are using cast metal bottoms and full length hardwood crutches. In both cases attention to cross section has brought wall thickness down to 1/8" at the engine, the minimum when lugs are used. Considerable attention was shown at Dallas to clean aircraft without abrupt breaks in lines, or sharp protuberances."

Some cynical experts doubt that great increases in performance result from hopping-up. Of course, others will disagree, including some prominent winners. However, things have come to the point where almost everyone is working on their engines, mostly for consistent operation. This includes beefing-up the weak spots and cleaning up the inside of the power-plant. One consistent winner considers the engines okay as they are, provided the builder finishes the job after the factory leaves off. This will mean little or much work, depending on the experience and ability of the flier. The greatest performance increase comes from a genuine knowledge of the best prop, engine, and fuel combination for a given model. Mahieu's speed articles in recent issues of M.A.N. are considered sharp.

R.O.W. Inasmuch as the ships are basically the same as R.O.G. free flight, only float details remain. So many articles have been printed that there is little need for dimensional details. Suffice it to say, that the most popular and successful float arrangement is one wide float forward and two small rear floats, one at each tip of the stab. Rectangular cross sections are used in almost all cases. At Dallas the wide forward float skipped like a flat stone across successive wave tops. Rough water quickly proved that too many builders have the prop disc too close to the water. Taibi, on the other hand, cautioned us that one important factor is not to create too much of a nose-down, or tripping moment, between thrust line and floats. Take your choice!

One startling feature of R.O.W. flights was a near elimination of spiral dives. Why? Many of these R.O.W. ships are lively fliers; even if their performance is off a bit compared to land gassies, they are faster than the R.O.G. of a few years ago—which frequently spiraled-in. The floats have bearing on design through lowered center of drag, alterations in side area, lower C.G., and added resistance. Whatever the answer, it should be isolated and shot into the arm of R.O.G. free flight.

Rubber. There are no unusual trends in rubber. Nevertheless, certain facts are evident when compared with, say, gas. The rubber man takes his airfoils seriously, even those who successfully fly gas—where the same flier may use a zip-zip wing section. How come? Do heavier loadings and smaller wings (in relation to loadings) require better sections? The R.A.F. 32, Eiffel 400, and to some extent the NACA 4612, are popular. A number of prominent Wakefield fliers say the last-named section has noticeably increased their performance. This includes one flier who has held three records. Expert rubber fliers say that these ships really perform, from 300 sq. in. on up. Due to lack of kits and scarcity of acceptable plans, rubber is highly individual. A good prop, and plenty of it, with an adequate motor to spin it all the way up, coupled with light (but strong!) construction does the trick. Single bright exception that proves the rule (doubtfully!) was Everett's clever tandem with a rear wing having more than 80% of wing area. It glided impressively. Trivial observation: these days the boys light the fuse before they wind. Cigar please!

Design Forum

(*Continued from page 20*)

angle-of-incidence. First, try the wing with the trailing edge only 1/16" lower than the leading edge. Fly the model again and note its reaction. It may be necessary to reduce the wing angle-of-incidence still more so that it is set at zero, and the stabilizer angle may have to be reduced also to zero. Usually with this combination, the wing and stabilizer setting are either, (1) stabilizer zero, wing 1° to 1-1/2°, that is, the trailing edge is 1/16" lower than the leading edge (with a 3" wing cord). (2) The wing angle-of-incidence is zero and the stabilizer angle is minus 1°.

Usually the first arrangement proves most satisfactory. However, with the wing in the high position you may notice another

reaction—the plane may bank more steeply. This action is caused by raising the side projected area above the center of weight of the airplane (produced by raising the wing). Consequently, to restore proper balance so that the center of side area remains in its original position, a small fin must be cemented vertically to the underside of the stick immediately beneath the wing. This fin should be approximately 3" wide and 2" deep with the lower edge slightly rounded. Increasing the area in this manner makes it necessary also to increase the fin area slightly; the height of the fin should be increased about 1/2", to 4". Fig. 1 shows the side-view of the basic model (A) and of the modified parasol arrangement (B) with the fin. Now test this parasol model and check its actions. You will find that the bank is very much less and that the model flies steadily without erratic movement.

These tests have brought out two important points: (1) that the higher the wing is above the line of thrust or propeller shaft axis, the less the *difference* in angle should be between the stabilizer and wing. The stabilizer must have either greater angle-of-attack or the wing must have less, or there must be a combination of these changes. (2) Area must be placed below the line of thrust to compensate for the raised area above it.

Another vital condition in plane performance is illustrated by a design arrangement submitted by George E. Pupac, of Manhattan Avenue, Youngstown, Ohio, Fig. 2. His design is essentially the same as the high-wing prototype test plane in respect to the features we have discussed, namely, the wing is parasoled relative to the thrust line and stabilizer and wing angles are the same. However, there is one other feature here which it not visible because it deals with weight and not structure. In this model the center of gravity is *above* the thrust line. Experience shows that this arrangement creates certain stalling tendencies. At excessive climbing angle the plane will climb and instead of recovering, will increase its angle until it loops or falls off into a climbing spiral. The trouble is, one cannot depend upon which maneuver it will execute and therefore this condition is a hazard in contest flying because of unreliability and inconsistency.

For complete stability under all conditions and for non-stalling tendencies, the thrust line should be *above* the center of gravity. For instance, turn the page clockwise so that line W_1 is vertical, this throws the plane into a climbing attitude. The line of thrust is pointed upward; the line of wing reaction is pointed upward and back to the right. The resultant (R) of the propeller thrust and wing lift, is parallel to W_1, the pull of gravity. You will note that the resultant R is forward of W_1. The two forces create a clockwise rotating couple which noses up the plane into a stall. As the angle-of-climb increases toward the stalling point this couple also increases, instead of becoming less, as it should. Consequently, with this increase the stall is increased until the plane is nosing straight upward and finally loops or possibly falls off to one side. Of course, the tail is lifting too, in a climb this helps to compensate for this clockwise movement. However, if this couple increases, the speed of plane drops, and therefore the lift of the tail decreases. Consequently, its corrective effect decreases as the stall increases, and so the tail becomes relatively ineffective.

It is obvious from this that if the center of gravity is lowered to the position of the thrust line, and the thrust line is raised to the former position of the center of gravity or above it, this couple and its reaction will be reversed. Instead of a clockwise couple being generated in a steep climb, a counterclockwise condition will result. Fig. 3 illustrates a plane with a design setup that will correct this unstable condition.

Mr. Pupac's design is excellent in some respects, but the low thrust line will give poor results. It involves two other problems, besides the one mentioned. First, his design in Fig. 2 must have a landing gear to

provide propeller clearance with the ground. This landing gear must be of retractable type or a rigid type which gives added drag during flight. Both of these conditions are undesirable and are to be avoided if possible.

A second characteristic, as shown in Fig. 2, is the position of the center of gravity rearward of the wing, produced by the weight of both the motor and the tail being located behind the wing. We do not see how it is possible to provide proper balance in such a plane, so that the center of gravity is forward beneath the wing as it should be, without weighting the nose. In order to have the center of gravity beneath the wing the motor and propeller would have to be placed at the forward end of the nacelle or pod; then the weight of the propeller would help to balance the weight of the tail. With the engine and propeller at the rear, added auxiliary weight would have to be placed in the nose to give proper balance. This would increase the weight of the airplane unnecessarily.

The design shown in Fig. 3 overcomes all of these difficulties. Here we have merely reversed the motor pod and the boom holding the tail. The tail-holding structure now becomes a long thin fuselage; the pod is raised and connected to this fuselage by a pylon of similar contour to that shown in Fig. 2. The wing is mounted on the top of this motor pod.

Now let us look at our aerodynamic conditions. The weights of the boom and tail, and the motor and pod have been interchanged. These parts usually are approximately of the same weight, so the vertical position of our center of gravity remains the same as in Fig. 2. However, the thrust line has been raised to a position above the center of gravity. Also a very short and narrow landing gear may be used in place of the long gear shown in Fig. 2. In fact with skids on the tips of the stabilizer a single partly enclosed wheel will be sufficient for the landing gear. This wheel may extend slightly below the bottom of the fuselage. In this position it will give very little if any drag.

Now turn the Figure clockwise to the right so that line W_1 (Fig. 3) is vertical. We see that the resultant R of the propeller thrust and wing reaction is to the right of W_1, so that a counterclockwise couple is formed. This is a couple which increases as the angle-of-climb increases, to compensate for and correct the tendency to stall. A machine of this design, you will find, will nose up to a certain angle-of-climb and hold that angle without looping as it gains altitude.

This type of model not only is very stable and consistent in flight but is comparatively easy to build. The lower fuselage that holds the tail can be of simple four-sided box construction, with two vertical balsa sheets cemented to its side and extending upward to create the pylon. The motor nacelle may be of square box construction and cemented between the two upper ends of the pylon sheets. The wing then is mounted on the top of the motor nacelle. What could be simpler than this? Another advantage is the extension of lower fuselage nose forward and below the propeller. In landings and dives into the ground (if these take place) the propeller will be protected. We suggest that you try this combination. We doubt whether you will wish to go back to the old type of low thrust line model after seeing this type of ship perform.

A number of our readers have been puzzled as to how they can locate the center of gravity of their plane. This is quite a simple mater *after* it is built, but a most difficult one to determine accurately before the plane is constructed. In designing your plane it is essential that you have some idea as to the location of the center of gravity because the position of the wing, etc., is determined by the C. G. position. Knowing where the center of gravity will be, after the plane has been built, comes from long experience. After having built planes for 30 or 40 years it becomes second nature, so to speak. But how many model builders have been flying planes this long?

While you are designing your airplane, the center of gravity can be located approximately as follows: determine the center of weight of the motor-unit and mark it on your drawing, as shown in Fig. 4, arrow A. Measure the distance from A to center of the stabilizer, arrow B. Divide this distance into tenths, then measure 4/10 rearward from arrow A and mark a point, arrow C, on the drawing. Now the distance between A and B will be divided into 40% and 60% so that arrow C is 40% of distance AB to the rear of A. Arrow C will be approximately the center of weight of the fuselage and landing gear without the motor unit. Now we will asume that the model weighs 10 unit. Usually the fuselage, landing gear, etc. represent 4/10 of the weight of the airplane. The motor weighs 3/10 and the wing weighs 3/10 as indicated in the Figure. Now the center of gravity of the motor unit and the fuselage unit will lie between A and C at arrow D, so that distance from A to D is four units and from D to C, three units. In most models the wing will be directly over this point, or nearly so, so that the weight of the wing will act through this point and therefore, point D will represent the center of weight of the airplane.

Don't forget to send your questions and problems to *"Design Forum"* for discussion.

Report From the West

(*Continued from page* 8)

u-control fan and is making a name for himself in the stunt circles. Denny "Hogan" Davis checked in with his famous *San De Hogan*, etc., line of ships and won another 1st in Open A class. Berkeley Models have Denny under contract now so we should see more and more of those hot f.f. jobs rolling off the production line. *Results: 1/2 A Jr. Class*—S. Decker; *Sr.*—L. Norenberg; *Open*—D. Ward. *A Class Jr.*—J. Bilteman; *Sr.*—Charles Young; *Open*—Denny Davis. *B Class Jr.*—R. Isaacson; *Sr.*—Don Wilden; *Open*—R. H. Anderson. *C Class Sr.*—Tommy Moffitt; *Open*—L. Corbly. The beauty event was won by Don Wilden with one of his originals. L. Regan was the contest director.

Mom and Pop Robbers sent us the dope on the California State Fair Control Line Contest that was held September 9th and 10th. The host club was the *Sacramento Capitol Screamliners*. This contest was run according to the *Western Associated Modelers* rules. John Shoe, President of the *Screamliners*, CD'd this meet, and of course Mom and Pop were right in their pitching with their very able assistance. A general admission ticket to the Fair constituted the entry fee and there was no limit placed on number of events entered. Many fine trophies were awarded, among them special awards and trophies for the fastest speed flight and highest point precision flight made.

We recently had a bit of a chat with Les Bartlett, National Champion modeler. Les is appearing on a big television show in Washington, D.C., and will be the guest of the *National Exchange Club*. Doc Barringer and his fellow club members of the *San Diego Exchange Club*, presented young Bartlett with some very nice traveling bags with which to make the trip. The *Exchange Clubs* of San Diego are making plans to give the modelers of that city some much needed flying sites. The *Aeroneers* are losing their excellent free-flight field because of the expansion program of Montgomery Field, formerly known as Gibbs Airport. The *Airliners* have been more or less orphans for the past several years flying "catch as catch can" and have had a rough row to hoe. We certainly hope that things will break well for these two top notch flying clubs.

R. J. VanLannen, President of the *San Diego Airliners*, is leaving that fair city to reside in Los Angeles. Van will attend the University of Southern California, and the Los Angeles flyers will gain a fine modeler. Van will surely be missed.

Jack Koger, Fresno scholar, is "beavering" away once again with some of his new free-flight designs. We have known Jack for a good many years, and his ships have always been tops. It was "way back when" that Jack, Pat Scanlon, and yours truly were just starting out in u-control. In-

verted flight was just in the experimental stages, and we had seen only one ship flown inverted by Roy Mayes when we decided that this type of flying was for us. Three identical ships were put together, and then the fun began. That reverse control when inverted was really a tough one to master, but we finally won out and we thought we were "wheels." It seems that after learning to fly inverted, the ships got a bit tired and a newer design was sought. At this time your reporter designed the forerunner of the first "Zilch." Oh well, enough of that! Glad to see you back in the balsa shavings and glue, Jackson.

The *La Mesa Airfoilers* and the *San Diego Airliners* had another of their stunt contests a few days ago. The *Airliners* managed to take the "mug" back by a scant 36 points. As we said before, these two clubs are very evenly matched. Jere Robinson of the *Airfoilers*, gave us a look at two very clean-cut scale ships. One was the famous Laird *Pesco Special*, powered with a *Torpedo 24*. This ship weighed in at 1 lb. The one that stole the show was his Douglas A 26 powered with two *Anderson .045's*.

Phil Stevens, another of the old time builders and former pilot for Bucky Monroe (Bucky really builds the scale jobs), is now racing the "jalopies." He still keeps his hand in at the local hobby shops when his bruises let him, and has gone in for the smaller scale ships. Guess Bucky left his mark when he moved to Los Angeles; recently we were looking at a couple of Phil's World War I ships, a *Spad* and an SE5. He tells us that this is more or less a starter for him—he plans to get into some of the larger ships in the near future, so you scale builders had better watch your laurels.

We received a bit of news about one of the wandering west coasters, Paul Frisby. Paul is located in Provo, Utah, and is now in the model business. Frisby used to work at Consolidated Aircraft in the model department. We had the opportunity of seeing his Convair 240 Airliner make several flights. This ship was built to exact scale and sported fully upholstered seats, complete interior finish, retractable gear, workable flaps, engine control on both engines, and many other details too numerous to mention. This ship didn't make a trip to any contests, but we don't mind going on record as saying that it is one of the best scale jobs we have ever seen.

The Institute of the Aeronautical Sciences, San Diego section, was approached by a representative of the Boy Scouts organization (Max McClay) on the possibility of obtaining I.A.S. members to serve as a faculty for an aviation course to be given to advanced Explorer Scouts. The executive committee members of I.A.S. went all out in aiding this worthy program. They established an aviation course with excellent guidance by members. The classes were amply supplemented with equiqment, models, and movies when possible and practical. Each scout built a model airplane which was used to demonstrate theory as much as possible. The curriculum for the I.A.S.-Explorer Scout Aviation Course included the following: Introduction to Aviation, Model Airplanes, Aerodynamics, Primary Flight Training, Aircraft Structures, Meteorology and Navigation, Power Plants, Instruments, and Airplane Design. When it was applicable, each lesson was accompanied by movies and practical demonstrations with models and equipment. Most of the lessons included a homework assignment. At the end of the course, an examination was given. The Explorer Scouts who satisfactorily completed the course, received the "Aviation" award as specified in the official Explorer Scout program. Classes were held each week, and each lesson took between two and three hours. As each instructor finished his program, he made up three or four questions to be used at the completion of the course in a final examination. Top notch men in the Aviation Industry such as Jack Mason, Ernie Stout, Ray Volluz, Norman Maxwell, Richard White, Leon Wasika, Walter Couts, and Ralph Bayless donated their time to make the course the huge success that it was. Over 100 scouts participated in the program. The instructors were from Consolidated Vultee, Ryan Aeronautical Co., Solar Aircraft, and other aircraft companies. Program such as this should help to develop future modelers and aircraft specialists.

See you here next month. Remember, you modelers from the west—this is your column, so let's hear from you.

Scrap Box

(*Continued from page 2*)

strate how science wins over all or, as they used to say in the victorian novels—OR, How Science Came a Cropper. Pop Robbers brought this to our attention while preparing *Design Trends at the Nationals.*

Comparatively low ceilings at the Nationals made it difficult to spot trends in indoor design. Nationals times don't compare with high times back east at Lakehurst, or on the coast, where Pop's gang have learned a thing or two about the mike jobs. Near Oakland, big hangars and unlimited ceilings, with large area to allow large turns, justify certain design and adjustment preferences. These don't pay off at the Nationals. For the benefit of indoor fans who may have felt left out of the Nationals article, Pop says, "Superlight construction braced with .0005 tungsten wire and a non-parasitic adjustment built-in and thrust in the line of flight, lighter rubber and more winds, results in a slower rate of climb, longer motor run, improved cruise, and better duration. Selection of wood has become an art, now taking more time than the construction of the model. Examination and selection of fine strips to be cut out of flat stock, weighing and testing each piece cut out, final selection of several, is a painstaking process." This is also true of indoor hand-launched gliders.

But the boys out-experted themselves at Dallas. The inside dope gave them a ceiling of twenty feet more than was actually available. Now it seems these boys build their gliders on a series of variable factors—wing area, weight, ceiling height, etc. All these factors are considered and are worked out to require full strength and all their launching skill to get up to the ceiling. At Dallas, Carl "The Arm" Rambo had to sit on the floor and still hit the ceiling!

One begins to understand how some of those west coast boys have been beating a minute for so long with indoor gliders. Wood is the final criterion. Wood is gathered with the help of modelers all over the country. Wing wood weighs from four to six ounces per cubic foot, depending on ceiling height. Camber and undercamber is varied accordingly. Length of boom and ratio of stab area to wing area is also determined by ceiling height. Consistent placing with the winners is not a matter of good luck but rather the result of years of careful study and experiment.

This must be national indoor glider week, for William Roosa, Great Bend, Kansas, is steamed up about our recent crack that something or other was no more scientific than the average all-wood hand-thrown glider. After Pop Robbers' notes, who are we to fight back. Just look out for these glasses, Mr. Roosa!

Sez he: "Hand-launched gliders give more performance for the expenditure of time and money than any other type of contest model; if ratio of glide time to power run is any measure of efficiency, the H.L. glider outranks gas and rubber models in efficiency; if designs are 'guess-timated' by a few simple rules of basic proportions, etc., then we must recognize that the majority of all models are so designed; if H.L. gliders follow a rule of thumb in adjustment, so do all other models—a rule of thumb that is the result of trial and error may not be a scientific fact but it is just as valid; much of the technique depends on the builder and, while it is true that a strong back is an asset (but not the only factor), is there any science involved in purchasing a hot motor or several ounces of rubber to use in a model?

"To be sure the motor operates on scientific principles," continues Roosa, "and may be a very efficient piece of machinery, but the same is true of the 'motor' used by the H.L. glider. There are techniques of making up and using rubber, but are these any more or less scientific than the launching techniques used with the H.L. glider?

"Aerodynamically, any well designed glider is more efficient than a powered

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model, since it does not have the extra weight and drag of a powerplant. If the aircraft is designed for gliding or soaring flight, it is logical to omit the motor; mere lack of a motor does not make the design of a plane more or less scientific than that of another plane. Of course, quite a bit of research has been done on controline models, especially on motors, tanks, fuels, and props. But isn't it fair to conclude that the design, adjustment, and flying of H.L. gliders are specialized arts and, while not on a truly scientific basis, are as scientific as the design, adjustment, and flying of other types of model planes." If they ain't they should be, Mr. Roosa!

W. A. Manly, Jr., Fairhope, Alabama, who knows what it feels like to win in speed, is disgusted with the latest developments in the winged motor division. "I used to enjoy it immensely," says Billy, rising neatly off the dolly, "but have you had a good look at the little monstrositites we have to build since glow plugs came in? I like speed because I like to hear a well-designed, well broken-in, and well cared-for motor revving up. But now competition compels us to file here and cut there and generally mess up a motor in order to fit it into an ever-decreasing airplane. Some people are cutting off the lugs and mounting the engines by the front and back plate bolts. I quit before that!

"Then there's the guys that soup up their engines, doing all sorts of machine work inside. Sure, I enlarged the intake on my *Mac 19* but it still starts easily. You see fellows with expensive starters grinding away and nursing their motors to life, but you see those same motors take the firsts. It just isn't right. Then, too, these very small planes are hard to fly if you haven't got a hard surface for operations. There's lots more but you get the idea.

"What do I think should be done about the situation? Well, first there should be some kind of a wing area rule. I fly 19 sq. in. on the *Mac 19* but it ought to be 50 or 60 sq. in. Other classes in proportion. There ought to be some sort of a cross section rule. Perhaps something about no motor alterations except with the manufacturer's approval. Some simple rule could be figured. Probably nothing will come of this but they say pebbles can start landslides."

Adding another pebble, Billy, wonder why they couldn't have a rule forbidding cutting lugs off engines and slicing off cooling fins. That automatically makes a difference on cross section. And, hoping that the speed experts don't beat our brains out, how about a minimum span for each class. If figured on a minimum practical aspect ratio, it would be impossible to get below certain reasonable areas. Coming, mother! Incidentally, don't know what this has to do with the price of bacon, but some Britisher made an exhaustive analysis of the cost of operating all kinds of powerplants and came up with surprising proof that the cheapest in the end is *Jetex*. The way we break props around here, burn up glow fuel, wear out plugs, we won't argue with this Englishman either.

This reminds us of the circus answer-man who explained that his feats of memory were performed by association of facts, such as the number of railroad ties between Harrisburg and New York with the number of rooms in the Hotel Sherman in Chicago. By similar methods we hear about the Wakefield.

Aarne Ellila, of Finland, took it again with a total of 732.1, three flight average of 266; Evans, England, was second with 660; and A. Leardi, Italy, third, with 644.8. The only place taken by an American, was a proxy-flown 6th by Lo Salisbury, with 606. America, it must be admitted, virtually disgraced itself by its treatment of this important contest. One of our six eliminations-winning machines was at Dallas, and at least one other had not even been sent over for proxy flying. Since both planes belonged to people who had gone to England last year it must be presumed that we did not put forth our best effort this year. There is a great deal of beefing among expert rubber men but, beyond mention of the fact, we shall let it go at that. Who is to blame?

But there is another aspect to this question that should challenge American modelers, and that is the growing suspicion that we are turning out second rate rubber models. Ellila certainly proved something or other, for his two wins showed that he could win in bad weather or fair. We have lost the tradition of the standout airplane. The second place winner, Evans, is the creator of the *Jaguar*, which has put up many remarkably consistent performances. Gone are the Korda types of yesteryear, or the really tough to beat *Clodhopper* flown by Jim Cahill.

We once saw the original working drawings for the *Clodhopper*. These plans had been mailed back and forth between brothers Jim and Bob, (the latter another old time expert) and were covered with notations and suggestions that led to such features as its streamlined thinly-planked fuselage, the folding one blader with tensioner, hollow spars, short landing gear. Was it worth it? Well, brother, if you were one of those guys—American, British, French, and what-have-you who were busy trying to stop Cahill—you knew darn well it was worth it.

Rather late on a cloudy afternoon at Detroit—this was in 1938 after the *Clodhopper* had laid outdoors for three months—there was only one job at the meet that was soaring. To us it looked like somebody's glider. Heck, no, said some contestant proudly, that's Cahill. Yep, that ship won the Moffett and the Wakefield, and lots of other events we can't remember.

There is too much of the "shoot for the thermal" business in this country. There has not been a truly stand-out world beating airplane for years. So how about it, guys? Let's burn the old heaps and start out with the impossible in mind. Yeah, it still has to fly in the wind. If the speed boys can learn their answers, if the stunt men have ships that will do any pattern, why can't the rubber men find the real answers.

And let's do something about the Wakefield, contest-wise. If we don't, we'll soon have to hide our faces internationally. We've lost three years running. How many more? We should go over with ships that figure to win, unless they get the bad breaks, not with ships that don't figure to win unless they get the good breaks. How about converting the rubber fuselage event to Wakefield rules, particularly at the Nationals? There is still rubber stick for the guys who don't want to fuss. Incidentally, Carl Wheeley remarked on August 24 that AMA still hadn't heard from Finland as to the winners. It seems that we could chip in to have some guy send a cablegram the night the finals are flown! And so another Wakefield becomes inglorious (as far as the Americans are concerned) history. Apologies to Salisbury for that 6th and to the other boys who tried.

If you want something nice in ½A, suggest you dig up the back issue of MAN with the *Firecracker*—an .049 pylon by the writer, but equip it with a wing from a *Midwest* CO-2 model. Forgot the name of the latter ship but it was a diamond fuselage job from sheet balsa, with a built-up wing on a high pylon. Or get the plan and make such a wing. It will be worth it. In evening air, mostly after sundown, this hybrid averaged 3:00. The glide is terrific. Pinned down Wally Simmers at Dallas and he said the *Midwest* wing was the result of many tests on airfoils and that the section giving best climb and glide had a section close to a Clark Y top and RAF 32 bottom. Junior has been mixing wings and fuselages, hence this and other interesting discoveries. One hand-glide and he hit his first thermal with a *Midwest Sniffer* sporting a *Phoenix* wing. That was the first and last flight our new *Spitzy* ever made. Whoosh! went the thermal after three minutes. Some of these crazy combinations go better than the "thoroughbreds." He cut the center wing panel out of a *Cosmos* towliner, chopped off some

stab, then put in a *Wasp*. For demonstrating how to live on the edge of the cliff without falling off, this one adds some new tricks.

It was a sunny Sunday afternoon in 1938 and one of those old fashioned free flight meets had reached its terrible climax at the Rosecrans and Western Avenues site outside Los Angeles. Our hero was sitting in his car waiting for the patchwork to dry. Just then a car with a foreign license parked alongside. They couldn't see much, but they were too curious to drive off. Our hero heard wifey repeatedly urge hubby "to push off and see what was up." Hubby pushed off. Before long he was back. "A lot of loopy blokes," he explained to wifey, "playing a game of some sort. They have tiny petrol motors in small airplanes. They crank away for dear life and, if one catches on, they turn the blooming thing loose and up it goes. Then it either starts looping 'til it smashes into the ground, or it goes on up out of sight, or the wind takes the thing and it is darned well lost either way. Kind of potty, what? The lucky ones are the blokes who can't start their balky motors."

And for that expose of life on the spectator's side of the fence, Carl Heckler, you get the free subscription for the best tall but true story of the month.

Finland Wins the Wakefield

(*Continued from page* 21)

importance of the contest and the fact that the different nations are getting closer to each other for friendly competition in the sporting spirit, without allowing the thunderclouds of politicians to disturb them. More events such as this would forge closer bonds among modelers wherever they might live, as sporting aviation is their only object. This is also the purpose of the F. A. I.

From early morning there was great activity in the Technical Building during the time the modelers were preparing their planes for the event. Processing of the models was started Friday noon by Mr. Carl Studen who had the entire responsibility of making certain that all the models conformed to the rules. Every team had been assigned a certain time, when they were to take their models to the inspection office. Waiting and the losing of time were therefore avoided. By Saturday noon all the models had been approved and everybody was anxious for the flying to start.

At the first glance the competitors were not too well satisfied with the Jamijarvi field. The competitors were giving the last and the terrain is full of hillocks. The field is not as large as most of the modelers use in their native countries. These facts were well known by the meet managers, but in their opinion, weather conditions are more important than the field itself. When it is very windy, even the biggest field seems too small, but this contest would occur at night, when it is calm.

By evening when the sun was going down, there were dozens of models on the field. The competitors were giving the last touch to their planes, and were checking weather conditions. On the day of the event, Mr. G. Joostens, well-known manager of the Belgian team, was test flying the proxy model of Y. Joostens, which flew out of sight in a strong thermal. All his companions were alarmed, but after a while, the plane was found over three miles away.

During the entire summer the weather had been quite poor; the day of the event, however, dawned beautifully. It was warm, but the weather became most uncertain, for there were several heavy showers, and due to a thunderstorm, the wind changed constantly. It had been announced that the contest would take place at 7 p.m. At six o'clock, a heavy thunderstorm passed over, and in a very short time the countryside was covered with big ponds and brooks. The situation was most exciting; could the contest start as planned? Before long, the clouds seemed to break a little and the sun came peeping out. Cars full of officials took off to prepare the flying site, and at 7:10 the meet finally began!

Shortly after the start, it was noticed that the choice of starting place was not too good, since all models were drifting to the woods near-by. The officials can hardly be blamed for this situation, as it was impossible to guess which way the wind would turn. The models were not damaged by gliding into the forest, however, and before the first round was over, the wind had changed direction and was carrying the planes back to the field.

The speed of the wind all during the contest was only about 3 mph which can hardly be noticed. There was no trouble with thermals either, not of the kind at least which sometimes rise over very limited areas. Some "area thermals" were probably there, due to the normal temperature differences between open area and forests in the evening, when it is getting cooler. Thus, conditions were just alike for all competitors. The lack of thermals and the almost complete calm weather afforded the fairest possible flying conditions, so the airplanes alone would be the deciding factors.

The competitors, in general, thought the British would win. Italian fliers Sadorin and Leardi were also marked as possible winners along with Swedish modelers Blomgren and Stark. The Finns looked for as good a performance from Ellila as he had shown the year before in England. Among these, then, should be the envied winner.

As the first uncertainty at the beginning of the contest passed, things went very well. When half of the first round had passed, a fifth of the modelers had made flights. Mr. Evans was leading at the beginning, with a time of 209.6, but it was not long before the time of Ellila was announced as 238.0 which was the best time of this round. Mr. Leardi's time was 224.0 which passed Mr. Evans. The Dutchman, Seton, was not doing badly either, his time being 208.5, while B. Johansson, from Sweden (proxy-flying L. L. Salisbury's model), clocked 207.0. It was no longer so difficult to pick the top fliers.

The second round began at 8:30 p.m. The weather was getting even better than in the first round. The direction of the wind was

toward the field, so that the starting place did not have to be changed, and the evening sun had dried the earth out; the results of the second round were therefore even better. Everyone was watching the first three competitors; Evans and Ellila launched their planes at about the same time, so we had an excellent chance to watch and compare these models together. Both rose in a nice spiral to the right. As both reached the top of their climb, it could be seen that Ellila's model was soaring considerably higher than that of Evans. Throughout this flight their positions remained almost the same and Mr. Evans' model landed a little sooner. His time was listed as 232.8 and Ellila clocked 271.5, which was the best time of the round, and of the whole meet. Mr. Leardi was not as successful in his second flight as in his first—his time was 192.1. The fourth best in this round was Bachli, from Switzerland, with 207.0. The second start of the English flier Stevens turned out much better than his first, and he got the third best time of the round, 214.1. Seton, soaring steadily with his modified Korda design made the good time of 200.7.

After the second round was finished at 10 p.m., everyone went to eat, and to prepare their models for the third round, which was scheduled to begin after midnight. The top place men were as follows: A. Ellila—509.5; F. W. Evans—442.4; A. Leardi—416.1; P. K. Seton—408.7; L. L. Salisbury (proxy-flown)—406.2; and A. Blomgren—393.5.

According to the program, the third round should have begun at one o'clock, but apparently the officials had been too optimistic; before this round could be started, the visibility became very poor. Therefore it was announced that the third round would not start before 2:30 in the morning—the exact time would be given over the loudspeaker. At 2:30 a.m. the whole field area was covered with dense fog and of course it was impossible to begin at this time. At about four o'clock the wind started to blow a little, which slowly dispelled the fog, while the morning sun helped too. About this time, it was learned that the contest would start again at five o'clock.

The spectators had gathered in the middle of the school area and they passed the time building bonfires to keep warm, watching the sun go down and up again, and checking the battle between fog and wind. During this period, many modelers also enjoyed the bright Finnish night, and the feeling of contentment which comes to anyone who is sitting next to a crackling bonfire on a high hill.

When it was time to start the third and final round, quite a few of the modelers were tired and sleepy. Most of them had not slept at all and the long trip some of them had made to Finland was now being felt. All of this was quickly forgotten, however, once the round began.

Although at this point it was quite clear that Ellila was leading, the competition was still very exciting. Should he have a little bad luck, he would quickly lose his leading place. Evans was the first one to take off. His plane soared nicely and finally came down with a time of 217.6. This gave him a total time of 660 secs. Quick calculations showed that Ellila would have to get a time better than 150.5 to beat Evans. At this point, many journalists, photographers, and other spectators gathered to watch Ellila's last flight. Would he win the cup again or would Evans take it? Aarne made a last careful check of the model, then went out to the starting place; the plane got off very nicely and began a good climb. The flight turned out to be very good and when the ship had finally come back to earth, the stop watch showed 222.6. Then it was certain Ellila won the contest since a quick look at the totals showed that even though many of the other competitors might make a top time, it would not be enough to win the Wakefield meet.

There was still plenty of excitement to follow, however. Leardi had a possible chance to beat Evans for second place, and to do this he would require a flight of 243.9 which was entirely possible at this time. He couldn't quite make it, however, and his third flight ended up at 228.7, which, though very good, was not enough to pass Evans.

Stevens was very successful on his third flight with a time of 226.7, the second best time for the last round and enough to bring him past L. L. Salisbury (proxy-flown by B. Johansson) and Blomgren. Seton was successful in holding his former place while Lustrati was not doing badly either and passed two others. Blomgren had tough luck with the last start, and as a result, he moved from sixth place down to the eleventh place.

As we mentioned in the beginning, eighteen proxy-flown models took part in the contest. Two of these were flown by modelers from the country of the owners, six were flown by Swedish modelers and the Finns took care of the remainder. Proxy fliers really have a tough time since they only have a short period to get acquainted with the models they are to operate, but they always try to do their best. Some of the proxy fliers had flown balsa models before the war, but since then have been flying only hardwood types, which was one of the reasons that the results were not the best possible, and some regrettable accidents occurred. A few of the proxy models were a little difficult to handle, and these of course just couldn't be flown by anybody as well as by its builders. We want to mention particularly B. Johansson and U. Hokkanen who flew the models sent from the U. S. by L. L. Salisbury and R. G. Schmitt. The American models unfortunately arrived very late at Jamijarvi otherwise the results might have been better.

When the contest was finally over, every one moved to the dining room and enjoyed a well-earned meal. After this, there was nothing to do but wait for the distribution of prizes and the final winner. The prizes were awarded in the dining room of the school. Professor Wegelius spoke a few words in French and English and then asked Mr. Houlberg, chairman of the F. A. I. Model Aircraft Commission, to arrange for distribution of the prizes. The Wakefield Cup was handed to the winner of the meet, Aarne Ellila, and he also received a special stop watch. This watch, which was donated by Pan American Airways, had travelled all around South America and the United States before being flown to Finland for this meet. The five top winners were also presented with examples of Finnish crystal as personal awards. After the prizes had been given out, everyone took his place and dinner commenced.

Later in the evening a dancing party, in the real country style, was held in the Technical Building, and everyone had fun until the "wee" hours when it was time to retire and collect strength for the long trip back home.

Many of the fliers would have preferred sleeping longer in the morning, but the buses had arrived to pick up the fliers, and the next stop was Tampere, from where they would travel to Helsinki and then homeward.

A luncheon was given by the *Tampere Aeronautical Club*, and following this, all the competitors entered a private car on the train which carried the tired group to the capital.

The modelers took their leave of Finland after expressing an over-all opinion that the contest was very successful and that the officials could be well satisfied with the results of their hard work. The departing competitors were tired in body, but the spirit of the competition and the comradeship that prevailed made up for this.

Despite the fact that the Wakefield rules are subject to some changes, it is probably that Finland will be able to hold the meet again next year if so desired.

At the present time it seems that our country is most desirous to be honored with the meet again and we call upon all other countries to send their representatives to this fine contest. We hope especially that the United States will be able to send a full team to our country in 1951.

1950 WAKEFIELD WINNERS: 1. Aarne Ellila of Finland—732.1; 2. F. W. Evans of Great Britain—660.0; 3. A. Leardi of Italy—644.8; 4. P. W. Seton of Holland—619.6; 5. H. R. Stevens of Great Britain—618.4; 6. L. L. Salisbury of the U. S. A.—606.0 (proxy-

(*Turn to page* 50)

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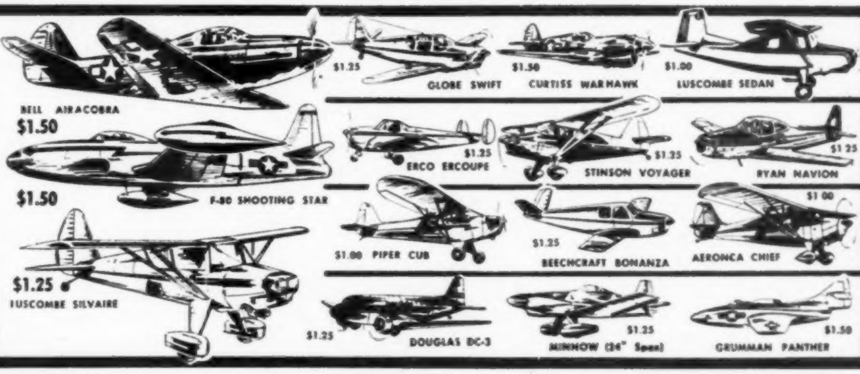

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flown by B. Johansson; *7.* S. Lustrati of Italy—597.7; *8.* B. Bachli of Switzerland—597.1; *9.* E. Sadorin of Italy—573.4; *10.* R. H. Warring of Great Britain—553.7. Other American entries were: *19.* R. G. Schmitt (proxy-flown by U. Hokkanen)—420.2; *28.* F. Takagi (H. Spring)—328.6; *45.* W. R. Mickelsen (E. Lumes)—234.9; and *52.* A. W. Leftwich (A. Deurell)—162.5. Other countries not included in the top ten places: Sweden, Belgium, France, Yugoslavia, Canada, New Zealand, Monaco, Denmark, and Norway.

Air Ways

(*Continued from page* 26)

Johnson (see photo herewith), who came from behind at the last moment to nose Freese out of first place, with a perfect spot landing. That the R. C. event was of top interest is proven by the many newspaper clippings Clay sent us, all of which described the radio control flying in glowing terms. We suggest R. C. fliers all over the country start working to have this event included in their own Plymouth meets next spring. We feel sure the Chicago Plymouth dealers will furnish any information required by dealers in other areas who are not familiar with R. C. flying.

ANOTHER NEW CONTEST, this one to gain new devotees to the sport of model aviation, has been announced. To be sponsored by Jim Walker, of A-J Aircraft, the prize will go to the flier who teaches the greatest number of students to "solo." The idea now will be to *encourage* the beginners to get in your hair, rather than combing them out!

* * *

Picture No. 1 shows Mr. B. N. Felstead (71 Watson Avenue, Toorak Gardens, South Australia, Australia) with a Class B stick model which he flew in the Australian National Model Plane Championship in April of this year. The plane has a bare weight of .023 oz. and a 23-1/2" wingspan. The wing bracing is nichrome wire while the motor stick is braced with tungsten. Powered by a 16" loop of 1/16" x 1/30" *T-56 Brown Contest Rubber* and with 1,800 turns the model, after being in the air for 9-1/2 mins., climbed to an inaccessible ledge about 70' up. The flight started out fine (and looked like a new Australian record) but since the plane could not be retrieved, this was his only flight of the meet. Even so the 9-1/2-min. time was good enough to get Mr. Felstead third place. His fuselage indoor model took first place at the same meet. It is interesting to note that Mr. Felstead uses *Jasco* balsa wood and *Cummings* microfilm. He is secretary of the *South Australian Associated Aeromodellers*, and is wearing the special cap and shirt of this organization in the picture.

Our second illustration, of Eastern modeler Warren Fletcher who is best known for his Wakefield flying, shows him with a ship he flew in the New York Mirror Model Flying Fair this year. Photo was sent to us by Richard Oscar Paul (32-76 Thirty-seventh Street, Astoria, Long Island, New York).

In our picture No. 3 we see E. Paul Johnson (1500 Arthur Avenue, Des Moines 16, Iowa) holding his radio control ship which won the R. C. award in the Illinois State Plymouth Meet. Paul tells us there were twenty-one entries in this event and 125,000 people jammed the Naval Air Station the day of the contest. He had to leave for home just as soon as the actual flying was over and Lieut. Charles B. Stone, shown holding the trophy in this picture, traveled to Des Moines the next day to make the presentation.

Our fourth shot reminds us of the contest days just before World War II when the "pencil bomber" was very much frowned upon. The photo was sent to us by Curtis E. Irby, Jr., (2119 Purdue Avenue, Muncie, Indiana), and the plane is owned by Jack Long. A *Torpedo* engine powers this ship which has placed high in all contests in which it has been entered, including a first place in the local Plymouth meet.

The scale modelers are represented this month by Nils Gunnar-Berg (Ersmarksgatan 18, Umea, Sweden). Illustration No. 5

shows a Swedish fighter designated SAAB J21, which is fitted with a *Mercedes* 1475 hp motor. The model is built-up, using both balsa and pine strips, and is fitted with an electric motor. Wingspan is a little over 3'.

Ronald A. Adams (78 Domonic Drive, New Eltham, S. E. 9, London, England) sent us a number of very beautiful photographs showing model activities at the *West Essex Club's* third annual contest, held at Fairlop—an unused airdrome on the outskirts of London. Picture No. 6 shows a Wakefield plane which he has named the Aristocrat. Its wingspan is 43-3/4" and the model is finished in black and yellow. It is powered by 12 yards of 1/4" flat rubber, and Mr. Adams tells us that the plane is a very fine flier.

NEWS OF MODELERS

PEN-PAL SEEKERS: Harry Pena, 54 Abercromby Street, Port-of-Spain, Trinidad, British West Indies, wishes to correspond with American modolers and trade souvenirs of Trinidad for American model supplies . . . Mirza Usman Beg, 299 Pakistan Colony, Lawrence Road, Karachi 3, Pakistan, 16 years old, wishes to write to an American modeler who is mechanically inclined and an avid free flight fan. He comments that his current interest is radio control . . . Kenneth R. Waddingham, Three Ramsdale Road, Carlton, Nottingham, England, 23, has been modeling for seven years, and is an ex-naval pilot; he enjoys team racing and free flight, is seeking a pen friend with similar interests . . . Vern Dean Kornelsen, Route 3, Box 8, Inman, Kansas, 18 years old, prefers controline models to all others, and would like writing to someone equally interested in this type of model work.

EXCHANGE MOTORS: Peter Cartazena, 19 West 111th Street, Apt. 1W, New York 26, New York, wants to exchange one of his *O.K. CO2* engines for another engine equivalent in price . . . Trevor Browse, One Park Villas, Whitecross Square, Chestenham, Gloucestershire, England, has an *E. D. Mk II* 2 cc. diesel in perfect running condition that he wishes to trade for a *McCoy 19 Red Head* or *McCoy 9* engine.

CLUB NEWS

California

The General Hap Arnold Perpetual Trophy was won by the Hell's Angels of Napa at the *Vallejo Sky Jockeys'* contest which took place on June 25. Other winners were: *Precision Class AB Expert*—Eugene Stiles 394 pts.; *Advanced*—Ronald Wood—311; *Beginner*—Allen Jaynes—268 pts.; *Precision Class CD Expert*—Eugene Stiles—378 pts.; *Advanced*—Charles W. Carr 347; *Beginner*—Floyd Bradford 266; *Precision Class ABCD Novice*—Jerry Nelson 123; *Precision Class ABCD Women's Event*—Janyce Wood 136; *Flying Scale Class ABCD*—J. C. Martin 192½ pts.; *Speed Class AB Expert*—Mark Brown 130.60 mph; *Advanced*—Karl Caldwell 108.40; *Beginner*—Otis Bradshaw 106.71; *Speed Class CD Expert*—Mark Brown 129.73; *Advanced*—Charles W. Carr 347; *Beginner*—William Ward 135.08; and *Team Flying Precision*—James Freshman and Jack Douglas 125 pts.

Maine

Howard Smith and James Clark have been called into active duty with the Air Force and Marines, and with Stan Davis and Bob Webster leaving for college, there will be only a few older members on the staff of the *Maniacs'* publication TALE-SPINNER. It may be necessary to curtail and perhaps even stop printing the monthly paper. Until a decision has been made, all correspondence should be addressed to the president of the *Flying Maniacs*, Stan Davis, 61½ Chestnut Street, Augusta, Maine.

New York

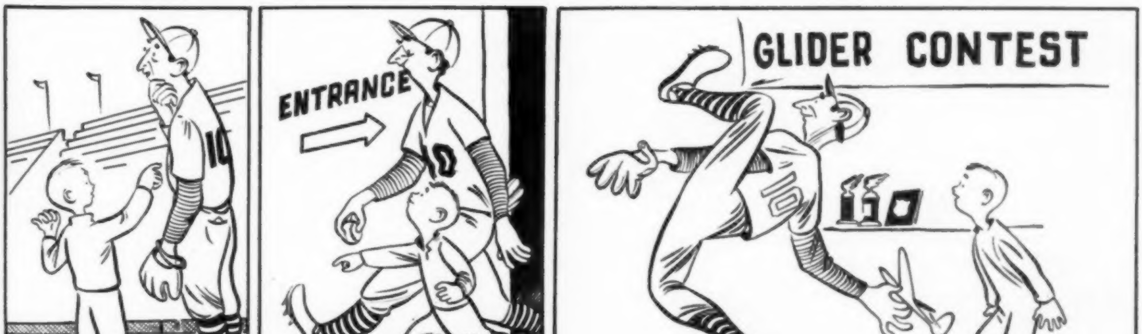
Since the *Prop Spinners Club's* reorganization, the membership has climbed to over 30, including such well-known modelers as Val Luce, Merrick Andrews, and Bill and his brother Warren Fletcher. An election for two temporary official jobs was held and Bob Hatschek is now the chairman with Bill Fletcher acting as secretary-treasurer. Meetings are held every second Wednesday of the month. Right now the most pressing problem on their agenda is finding a permanent meeting place.

Pennsylvania

The *Pittsburgh Control-Liners* have two contests scheduled. The first will be held October 8. L. Stoutenburg, Jr., 21 South Emily Street, Pittsburgh, is the contest director for both meets. Events include U-control speed, stunt, and scale. Their second contest will be held October 15, a U-control meet for team racing, which will be restricted to only members of the club.

• • •

Be sure to send in results of past contests, news of coming meets, interesting happenings among your group, etc. Remember that this space is furnished to you so that you can get a little free publicity for your Club—make use of it!



READERS

NAME YOUR PREFERENCE

Every reader of MODEL AIRPLANE NEWS has his own ideas of what should be featured in the magazine. However, few of you ever let *us* know, so we simply have to guess what will interest the majority of M.A.N. readers. Here's your chance to speak out—just mark your preferences below, clip out this ballot (or copy on another sheet), and rush it to our Editorial Office, at 551 Fifth Avenue, New York 17, N.Y.

1. (a) Do you like full size plane cover paintings, as on this issue?..........
   (b) Or, do you prefer model plane subjects on the cover?..................
2. Write (1) after feature you like best, (2) for the next, etc. *Cross out* those of no interest.
   (a) Scrap Box ....
   (b) Flash ....
   (c) Report From The West ....
   (d) Design Forum ....
   (e) Plane of the Month ....
   (f) Air Ways ....
   (g) World War I ....
   (h) Club News ....
   (i) Hobby Counter ....
   (j) Nieto WWI Scale Drawings ....
   (k) Engine Review ....
   (l) Cartoon Strips ....
3. (a) What articles other than those listed above did you find of especial interest? (Just jot down page numbers.)
   ....
   (b) What articles were of little or no interest? (Page numbers again.)
   ....
   (c) What would you have liked us to print in this issue that we didn't include? ....
   ....

Hobby Counter

(*Continued from page 38*)

the *Viper* skims the ripples very neatly. Another way to put those baby engines to work!

* * *

On the subject of boats, O-Lin Products (4914 N. Lincoln Ave., Chicago 25, Ill.), have a $1.98 *Chris Craft*, all plastic, that simply confounds description. The number of finely detailed parts will bowl you over, and includes props, every cleat, etc. The hull is ready to take the deck and cabin, and is of white plastic. Deck and other appropriate parts are in natural wood color. Can be equipped with one of those little electric motors with pen cells for power source. A quality item and a fine ornament for mantle or bookcase.

* * *

The old solid model firm of Hawk Models Co. (Chicago 18, Ill.), has a new *Grumman Panther* jet model, an all-plastic desk or shelf ornament that is second to none in beauty. In realistic blue-colored plastic, the ship is split along the center line, each fuselage side shell including the wing root into which the outer wing panel plugs. Tip tanks are in two pieces, one section notched to fit wing tip. Execution of detail is perfection. Every rivet (scale, too!) is in place and to make sure the delicate decals are in precisely accurate position, the figure or insignia also shows on the plastic. Tiny scale pilot is seated on a chute and, so help us, his features are lifelike. Very nice stand and base. Worth every penny of the $1.50 price tag.

* * *

RANDOM NOTES: What's new? Strombecker (Strombeck-Becker Mfg. Co., Moline, Ill.) have another 59c prefabbed solid, the *Flying Swordfish*, or Douglas 558-2, one of those Navy high-speed research planes. It is hard wood, beautifully shaped as per usual with Strombecker, with the short swept-back wings attaching by means of peglike extension at the roots which fit into holes in the body. There is a stand and wire mount, as well as a scale bubble canopy . . . Comet Model Hobbycraft Inc. (129 West 29th St., Chicago, Ill.), believe it or not, have 10c *Struct-O-Speed* kits that include two die-cut sheets and a wee machine-made balsa prop. At current prices for materials, a die-cut kit with plan—and the box, natch—is a near miracle at a thin dime . . . My customers are raving over Testor's (Testor Chemical Co., Rockford, Ill.) new $2.98 trio of *Little Dipper, Avro Baby*, Piper *Vagabond*. Reason? Prefabrication is not only competent, it is daringly progressive. Wing spars have tabs that fit into notches cut into the top and bottom balsa wing covering pieces. Parts are not only printed, but direction notes appear on wood with arrows to points. Even the shaped fuselage fairing has directions printed on its inside or concave side. The *Avro Baby* is particularly amazing, a very clever center section strut assembly licking for all time that difficult biplane feature . . . Aside to fellow dealers: Kramer Brothers Inc. (319 Fallsway, Baltimore, Md.), have a train accessories catalogue covering 25 train lines . . . Berkeley has taken over production of the well known *Air-O* props—as we write machine equipment is in transit from the west coast Air-O factory site . . . Burgess Vibrocrafters Inc. (180 N. Wabash Ave., Chicago, Ill.) have low-cost motor driven jig saw. Saws, sands, files wood and light metals; tilts, built-in blower. At $13.95, excellent

shop addition . . . Scientific Model Airplane Co. (113 Monroe St., Newark 5, N.J.) has four new authentic scale u-control models for .020's through .074's, at $1.95. Includes 22" airfoil-shaped balsa wing, carved fuselage and die-cut tail surfaces. These are: Piper *Cub Special*, Stinson *Voyager*, Aeronca *Sedan*, Cessna *170* . . . Apex Novelty Mfgs. Inc. (541-543 Orchard St., New Haven, Conn.), offers a ready-to-fly sheet balsa fuselage model with aluminum prop; 26" span, assembles with rubber bands. Price: $1.98.

BUILD YOUR OWN CUTTER

by Bill Dean

HAVE you ever gotten stuck on a model because your local dealer has run out of a certain size strip balsa—or been unable to find a piece of wood just the right width for repairing a breakage? If so, there is an easy solution. Next time this happens, just cut it yourself on your OWN *Strip Cutter*.

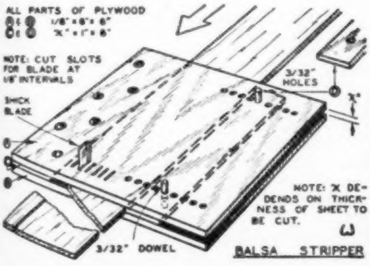
Construction is entirely of 3 ply and only takes two or three hours to complete at the most. Cut out the two square pieces (A and B) and fret out slits at intervals to suit yourself, say 1/16", 1/8", 1/4", 3/8" and 1/2" to take a razor blade of the single edge Schick variety. Also drill 3/32" holes as indicated, as close together as possible.

Next cut two strips 1" wide (C and D). Drill one piece to line up with the parallel rows of holes already drilled in A and B. The other piece is sandwiched between A and B, and six wood screws used to keep the three together.

To operate the cutter, feed in a piece of sheet until it reaches the cutting edge of the razor blade. Next insert D and push it up against the sheet, inserting two 3/32 dowels through the holes which fall in line.

Drop the razor blade in the appropriate slit to give the desired strip width. Holding the cutter in the left hand and taking up any crosswise slack of the balsa, push the sheet away from you with the right hand. If another strip is needed, just close up D and repeat the entire procedure again.

Incidentally, strip cut in this manner is quite as accurate as any ready-cut strip; and the ends are always smooth, not furry as sometimes happens with saw-cut strips.



"Don't worry, Mac . . . folding won't wrinkle them!"

Simple Proportional Control

(*Continued from page* 25)

again. Turn one of the pieces over and tin the other end too.

After the pieces are completely covered with a thin coat of solder on the ends place them in the grooved block you have prepared. Be sure they have *like poles* together. Wipe the tip of your iron clean and put on some fresh solder, then apply the tip across the junction of the two bars. Don't be impatient, hold it there till the solder squeezes out as the two magnets are pressed together. Remove the iron but hold the magnets firmly together till they cool.

Solder an eye on the other tinned end to receive the push-rod; a copper tack is fine for this purpose. Mash the shank in the vise a little to make it wide enough for the hole, then cut off the surplus length. Tin the head of the tack, and solder it to the magnet.

Scrape off all surplus solder with a knife. Solder on the double magnet will cause a lot of friction against the brass tube it is to work in.

From a thin brass sheet about .008 or .010" thick, form a tube around a rod just a few thousandths of an inch larger in diameter than your double magnet. Make the tube three times as long as *one* of the individual magnets.

Fit balsa blocks over the tube to leave a winding space in the center the same length as one individual magnet. Insulate this space with thin paper or cellophane tape, then wind on 75 to a 100' of #32 (or 60 to 75' of #34) enameled wire. This will give a drain of less than 1/4A on 3 volts.

As seen from the circuit diagram, this arrangement requires two batteries in series, but only one is in use at a time. This gives the batteries half time on and half time off, which lengthens their life considerably. For light ships only one pen cell is needed in each battery. If more power is required, two or even three cells may be connected in series for each side.

The rotary-type *actuator* requires only slightly more work to build. The principal difficulty is in procuring the proper size alnico disc which is magnetized across its diameter. There are some little electric outboard motor boats on the market which have a dandy alnico disc in the motor. There are some 1-3/32" discs on the surplus market, but that is a bit heavier than needed, making up to a finished weight of close to 2 oz.

Whatever disc you use, make sure it is magnetized *across* the diameter, and has only one North and one South pole. (Some disc magnets are available with two, or even more, North and South poles.) Suitable magnets, 3/4" diameter x 1/4" thick, may be had from R. Eyrich, 2566 North Forty-ninth Street, Milwaukee 10, Wisconsin. They sell at four for a dollar.

The disc can also be ground from a square block; in this case and also in the case of the 3/4" discs mentioned above, there is no hole to slide the shaft through, so a brass disc is soldered to one face of the alnico, with a tight fitting hole for the shaft. The brass disc should be as thin as is consistent with good strength, because the closer we can keep the winding to the alnico armature, the stronger the pull of the *actuator* will be. If you decide to grind down an alnico block, don't be surprised if the alnico wears the grinding wheel pretty fast as it is really hard stuff. It takes about 30 mins. of grinding to shape a 1/4" x 7/8" sq. block into a disc, and face one side for soldering. Other details of the rotary *actuator* are shown on the drawings. Keep it light, be sure the armature turns freely without scraping at any point, and make your soldered joints firm.

Now a word about the rudder on the ship. It has been found that a tall narrow rudder will require less power to move than will a wide one of the same area. On most 6' ships a rudder 1" wide and 5 or 6" tall will prove adequate, when turned a maximum of a 1/4" off center measured at the trailing edge.

Sometimes the movement of the rudder is hardly noticeable when the pulser motor is running, yet in the air it will turn the ship sharply. But be sure the movement is quite free; the rudder should slap back and forth sharply when the transmitter is keyed on and off.

If you want enough rudder action to really cut up, the surface should be of the counter-balanced type, as it is on many big planes. Either overhang ahead of the hinge at the top, or a hinge line set back about 20% on the rudder is effective.

Put a control horn on the rudder of such length that the *actuator* moves the rudder only about half an inch or less, for a full *actuator* stroke. The horn is conveniently made of about #18 soft wire with a small eye bent at the end to receive the push rod. After you see how much rudder the ship will stand, the horn may be shortened by bending a kink or two in it to increase the rudder movement.

Put stops on the *actuator* just short of the full stroke or it will not return from the end of the stroke without the air blowing on the rudder. It is a great comfort to see the rudder wiggling back and forth as the ship is released. If you don't know how much rudder your plane will stand, be sure to keep these stops set in very close for the first flight. Lots of ships have been wrecked from too much rudder, but mighty few have been lost from too little.

Next month we will take up the construction of the ground control unit, or pulser, and also the pulse rate control which can be added to the pulse proportion rudder control. This second control working off the same radio set in the plane may be operated on or off without affecting the rudder control. This control may be connected to the throttle or the elevators, or any second control in the plane you wish to operate. The pulse rate control will add only about 5 oz. to the weight of the plane.

RADIO CONTROL FANS

We have printed dozens of R. C. articles in past issues; if you do not have a file of these copies, send for our free list of R. C. articles.

World War I

(*Continued from page 13*)

bination. The 65 C.V's in service at the front at the end of 1917 represented the high-point insofar as quantities are concerned. And they were withdrawn from the front beginning in October of the same year.

Fuselage Construction. Designers of the Albatros machines had an excellent appreciation of streamline, particularly in fuselage construction. The C.V fuselage was built up of a series of plywood formers notched to receive four main longerons and two stringers—one on each side halfway up. The formers in the forward fuselage section were die-cut from large plywood panels, while those towards the rear were built up on jigs and made of plywood and solid wood members of varying cross section. Longerons also varied in cross section and tapered in cross dimensions towards the rear.

Except for the metal cowling around the engine section, the fuselage was covered with three-ply veneer. Side and bottom surfaces were flat; the upper surface was rounded, gradually flattening out at the tail. It was an extremely simple structure, without internal crossbracing. It had most of the features of monocoque construction without the cost and difficulty of construction. The C.V fuselage had a safety factor of 60, and was at least 2-1/2 times as strong as a wire-braced, fabric-covered girder type fuselage of equal size and weight. Bullets could rip through the C.V body without damaging it—where a direct hit on a conventional longeron would have collapsed the entire structure in flight.

"I" sectioned engine bearers reinforced with five-ply veneer were attached to three solid bulkheads and were held in place by metal brackets. The bearers were approximately 1-1/2" x 4" in cross section, and made of ash. Immediately aft of the engine section was the pilot's cockpit, sealed off from engine heat and fumes by a solid wood bulkhead.

The pilot's seat was built into the main fuel tank, the center of which was recessed to receive the seat cushion. The tank was filled from the right side of the airplane through a tube projecting through the plywood skin. A smaller fuel tank was mounted above and to the rear of the main tank, in the observer's cockpit. Either, or both, tanks could be used by regulating a fuel distributor valve. Each tank had its own fuel pump; engine driven for the main tank and hand operated for the smaller tank.

The pilot's flight controls were of standard German form: the stick was fitted with a double spade-handle grip with thumb trigger for the forward-firing synchronized machine gun, and there was a rudder bar with wire stirrups. The rudder bar was double, permitting adjustment for the leg length of the pilot. Standard flight instruments also were fitted.

The observer's cockpit was surrounded by a plywood gun ring mounted on small rollers. The machine gun attached to this ring was mounted on a metal post giving it a wide angle of fire. The observer's seat was made of plywood, hinged so as to fold out of the way when not in use. The bulkhead forming the back of the observer's cockpit was canvas covered. Pockets for maps were provided. The observer's pit also was fitted with such equipment as a radio receiver and transmitter, cameras and bomb release levers, depending on the plane's mission.

Because the empennage of the Albatros C.V was made an integral part of the fuselage it must be regarded as part of the body structure. The vertical fin, for instance, contained three "spars" which were, in reality, vertical extensions of the three rearmost fuselage bulkheads. To these were attached two ribs and the wood outline. The fin was plywood covered; the covering being continuous from the fuselage upper surface to the top of the fin. The horizontal stabilizer was attached in a little different manner. First of all, it was not built integrally with the fuselage, but was removable. The same three rear bulkheads which extended into the vertical fin, also extended horizontally outward to form cantilever beams which supported the tail plane. The latter was built in right- and left-hand panels, each with three hollow spars so proportioned that they fitted right over the cantilever beams. The horizontal stabilizer was fabric covered.

Both rudder and elevators were made entirely of welded steel tubing and were aerodynamically balanced. Both were fabric covered.

Two types of tail skids were fitted to the Albatros C.V. One was mounted in a conventional manner with its shock absorber system inside the fuselage. The other was mounted on an inverted pylon of four steel tubes attached to the bottom of the fuselage in which the shock absorbing system was entirely external. Neither tail skid was steerable.

The main landing gear of the Albatros C.V was made entirely of steel tubing. Four struts were of streamlined section and were removable as separate units. The rear struts were attached to the fuselage by means of steel fittings, in the form of clamp sockets which, when tightened around the strut ends, held them firmly in place. The forward struts were attached in a similar manner. The front socket fittings, however, were welded to a wide steel strap fastened to the underside of the fuselage. This strap also contained ball and socket terminals for the landing gear bracing wires.

The lower ends of the right- and left-hand strut pairs were attached to a piece of bent tubing, the ends of which also formed clamped sockets. The one-piece axle went all the way across the landing gear, and it was attached by rubber shock cord. Travel of the axle was limited by a steel cable, and the bottom of the shock cord was protected by a steel strip. A small diameter compression tube was bolted to the front lower strut fittings just in front of the axle, and behind, there was a stranded cable.

Braking system on the Albatros C.V consisted of a claw hinged to the axle in the center and operated by a lever in the pilot's compartment.

Part Two will include a description of the Albatros C.V wing structure, flight characteristics, and performance.

PHOTO CREDITS

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13	All	R. C. Hare
14-15	All	Plymouth Motors
28-29	All	Paul Gilliam

Stinger

(*Continued from page 11*)

ing its initial flight test. On its eighth flight, *Stinger I* promptly took off for points unknown on a 15-second engine run. Needless to say, a little more caution was exercised when flying the second model and numerous fine flights were turned in. On a 20-second engine run, the ship consistently turned in flights of over 2-1/2 mins. in calm air without aid from thermals.

Enough said for the merits of the little ship. The flight is the real payoff, so let us get started on the construction with that in mind.

Using carbon paper, make copies of the full size bottom and side patterns joining their respective parts along lines A-A and B-B. Now cut these shapes from hard 1/16" sheet, with the grain running lengthwise as indicated in the plan. In the case of the CO2 version, the sides are made from 1/20" sheet for lightness. Glue the sides in position on the fuselage bottom and allow to dry thoroughly.

In the meantime, the pylon can be cut from hard 1/8" sheet. For the ½A ship additional side laminations of hard 1/32" sheet are added with their grain running at 45° to that of the center ply. During the drying process, the pylon laminations should be weighed down on a flat surface, to prevent warpage.

Getting back to the main fuselage structure, the top edges of the side sheets are beveled, glued, and pinched together to form the triangular cross section as shown. When dry, the slot is cut in the position shown, and the pylon is inserted and glued in place. Now the hard 1/16" sheet platform braces are added and the wing mount platforms are glued in their respective slots. While drying, they should be checked for proper alignment with a right angle. Finally, the wing mount pads and 1/16" dowels are glued in position.

Next, the firewall may be cut from 1/16" plywood and the mounting holes drilled as shown. Before it is glued in position on the fuselage member, the engine and landing gear are bolted in place, and the hard 1/16" sheet balsa firewall braces are glued in position on the inside of the fuselage. When these are dry the firewall, including the engine and landing gear assembly, is glued in place, taking care that the thrust line remains at zero-zero. Finally, the scrap balsa fairing blocks are added behind the protruding portion of the firewall and carved and sanded to the shape shown. This completes the fuselage except for finishing.

Constructing the tail assembly is simply a matter of cutting the rudder and stabilizer from 1/16" sheet and sanding them to the section shown.

As mentioned previously, the wing is of conventional, one spar construction, and should present no difficulty even to less-experienced builders. First cut out eleven full and ten false ribs from 1/16" sheet. Now cut the trailing edge and spar to the proper lengths, notch the trailing edge to take the ribs and pin them down in the proper position as shown. Next, the full ribs are glued in position and allowed to dry, then the 1/8" square leading edge is added and held in place by pins. When pinning this or other members in place, the pins should be inserted on the inside and outside of the piece rather than forcing them through the wood, as this would make for weak points in the structure. While the leading edge is drying, the false ribs may be glued in position. When the wing is completely dry, remove it from the board and cut away the two tip sections. Before adding the dihedral, the leading edge, trailing edge, and spar are beveled to fit at the breaks. When a snug fit is obtained, pin the center section down on a flat surface and add the tips with a 4" dihedral at each extremity. After the dihedral breaks are completety dry, remove the wing structure from the board and add the dihedral braces, B1, the gussets, and the center section caps. The latter are cut from 1/8" sheet to the same shape as the top half of the built-up ribs for the CO2 model. Finally, the 1/2" square soft balsa tips are glued in place and carved and sanded to the shape shown.

The wing for the CO2 model differs slightly from the ½A version in that the ribs are of built up construction where possible. Five solid ribs are cut for use at the tips, center, and dihedral breaks. The rest are built up, the top being cut from 1/16" sheet to the shape defined by the dotted line on the full size rib pattern. The bottom of the rib is a hard 1/16" square and the spar must be notched to allow for it at the proper position.

When the wing is completed, carve and sand it to the proper shape using a medium grade sandpaper with a sanding block. At this time the fuselage may also be finished off by carving and sanding the pylon to a streamlined shape and lightly sanding down the rest of the fuselage to remove the fuzz before doping.

The rudder and stabilizer may now be glued in place on the fuselage, taking care that the stabilizer is set at zero° incidence.

The ½A wing is covered with lightweight *Silkspan*, while the CO2 version uses Japanese tissue for lightness. After covering the wing, add the hard 1/32" sheet wing keys as shown in the plans.

Finishing of both models consists of three coats of plasticized clear dope—that is, dope with a few drops of castor oil added—and trim depending on the individual taste of the builder. The ½A model is given an additional coat of fuelproofer on the fuselage, from the rear of the pylon forward.

When building the CO2 model, extreme care should be taken to make it as light as possible, since in low-powered ships of this type the performance is proportional to the flying weight. The original ship built as described had a smooth, steady climb and an exceptionally flat glide which enabled it to average better than one minute in calm air.

It will be noted that no particular fuel tank and cut-off arrangement is shown in the plans. Since there are several popular lightweight systems of limiting the engine run in use, we will leave the choice up to the builder. We have used a piece of transparent tubing marked for a 20-second fuel capacity; while light in weight, it was only fairly accurate and did not allow for fine engine-run adjustments necessary for contest work. Recently, one of the new Anderson cut-offs was tried and seemed to be the answer to the problem. We would advise that this be used for contest work.

The dethermalizer is also left to individual choice, but by all means use one. On our ship a small parachute of approximately one-foot diameter was used and found to be sufficient. A fuse of cord, soaked in saltpeter was used to time its release from a compartment in the nose.

Upon completion of the ship we would advise that you wait for a fairly calm day to test it, as small ships of this type are just not made to fly into the teeth of a gale. Before test gliding, check to see that all surfaces are in alignment; then hunt up a spot with fairly high soft grass. Glide the ship from about shoulder height directly

into the wind. If balanced properly, it should have a long flat glide. Any tendency to stall, or dive, can be corrected by warping the stabilizer trailing edge if the tendency is slight, and by adding weight to the nose or tail, if the condition is more pronouned. Now warp the rudder to produce a slow circle to the left. On the first powered flight, the engine can be slowed down by inserting a plug, with a hole drilled in it, in the intake venturi. Launch the ship into the wind; it should climb in a circle to the right as is characteristic of most pylon ships. Gradually increase the engine speed by enlarging the hole in the plug, and finally remove it completely. Under full power the ship should climb very steeply in a right turn, rolling out into a slow flat glide to the left when the engine cuts.

In conclusion, we would again like to advise the use of a dependable dethermalizer, as it is bound to see plenty of hard use with *Stinger*.

Sporty

(*Continued from page* 33)

and more oil-tight qualities of the covering. *Trim Film* was used for decorations. If electric ignition is to be used, install it now. The ignition system can be installed before or after the fuselage is covered because of the high location of the coil and batteries. Incidentally, be sure to mount the ignition accessories in the location shown on the plan because otherwise the force arrangement will be changed. For upright engine installation, the batteries should be lowered until they are in line with the crutch. All wiring should be soldered well and the system should be tested before the model is taken out to fly.

Glow-plug models should receive a coat of *Comet* or equivalent, fuelproofer to protect the finish from the alchohol fuel.

All our *Sporty* models performed best when they were balanced three fourths of the chord behind the leading edge. Movement of the batteries forward or back can correct any deviation from this balance point. On glow-plug jobs the addition of weight in the nose or tail can be used to balance the model. The model should be thoroughly glide-tested by hand until a flat glide to the left is obtained before powered flights are attempted. First flights should be conducted using very little power, and the performance should be carefully noted. The climb as well as the glide should be to the left; if the model banks too sharply when climbing, slight "wash-out" in the left wingtip should correct this. When the flight appears smooth, power may be increased gradually until, as you will discover, *Sporty* turns in top-notch flights on 15 secs. of engine run.

French Sportplane

(*Continued from page* 23)

Since V-J Day the French aircraft industry has undergone a chaotic and painful period of stress. Because the industry is nationalized, each of the rapid changes of government in France since World War II has produced one or more "reorganizations" and there are huge stacks of five-year plans, new programs, realignments, mergers, bankruptcies, etc. in the files of the French Air Ministry.

Topping all of this off has been France's well-known economic problems which, simply, have reduced the average citizen to virtual poverty. That means that there has been no money for anybody but the government to buy airplanes that were designed and produced in accordance with its own plans. This has inevitably resulted in a complete lack of competition, the production of grossly inferior aircraft designs because of the personal likes and dislikes of the officials and the virtual non-existence of French private flying. As a result, most French light aircraft have been designed purely for the export market, in which her industry simply cannot compete.

One of the odd quirks in the French nationalization scheme is that it permits a completely free rein to all of the various

factories in the design and construction of experimental prototypes. This explains the deluge of new French aircraft designs each year, particularly at the elaborate Paris Aircraft Show each Spring. Following this show each year, we have all seen articles in our aviation magazines containing dozens of pictures of new French airplanes creating the distinct impression that the French aircraft industry is operating at top speed. But behind these elaborate articles is the plain fact that what we are seeing is merely prototypes, one or two hand-made examples of each airplane. For only the French Air Ministry can authorize the quantity production of French aircraft through the award of production orders paid for by the French government. These airplanes, in turn, are sold solely by the government to individuals or through export and that has been the knot that has kept the industry tied up for almost 15 years.

Our Plane of the Month, the *Deauville*, is not only an excellent example of the situation in the French lightplane industry but also a good example of the skill of the French aircraft designer. This trim little monoplane can hardly stagger into the air under its official name, however, and French aircraft industry names have been one of the principal drawbacks to an understanding of their aircraft by U.S. aviation enthusiasts. Known informally (and easily understandably) as simply the *Deauville*, the full name of the airplane is the S.N.C.A.S.O. 7060—which will hardly bear remembering!

One of the great mistakes of the nationalizing authorities in France was the utter discard of such famous French aviation names as Nieuport, Breguet, Farman, Potez, Bloch, Loire-et-Olivier, etc. and the switch to the mouth-full of names that have been used for nearly 15 years. The authorities simply divided up the aircraft industry into six geographical regions: West, Southwest, North, Central, Southeast and "Middle", and all the factories located in one of these geographical regions were allocated to that ministry. The entire industry was named the National Aircraft Construction Industry which, in French, is: "Societe Nationale de Constructions Aeronautiques." These initials, S.N.C.A., are, therefore, the first part of the names of all French aircraft. The last few letters simply indicate the geographical part of the location of the factory, in French, of course. Thus, the Southwest, which, in French is "sud-ouest", is abbreviated "S.O." Putting them all together we get S.N.C.A.S.O., a mouth-full to be sure, but a simple one when you get used to it.

It is now impossible to trace the lineage of current French aircraft to the famous names of pre-nationalization. S.N.C.A.S.O. was originally made up by the combination of the Bleriot, Marcel Bloch, Loire-et-Olivier and Loire-Nieuport companies and for a while each of these individual products were clearly distinguishable. During the occupation, however, only the factory at Chateauroux remained outside the occupied zone and engineers and technicians from all the other factories made their way to this one and, finally, to Cannes. There they set up an organization known as the Technical Group of Cannes and proceeded to build two new aircraft. When the S.O. 90, a transport, was completed, ten technicians from the factory climbed aboard for the first test flight and right under the noses of members of the Italo-German Armistice Commission, took off on what was supposed to be a first experimental test flight but they didn't come down until they landed at Algiers, North Africa—free men! (After this the Germans prohibited the flying of prototypes!)

All of these changes, escapes and reorganizations have thoroughly mixed the identity of the individual design groups and the *Deauville* cannot be traced as a Nieuport, Bleriot, etc. but is simply an S.O. product. It actually began life as the S.O. 7050, a trim little low-wing monoplane with tricycle landing gear powered by a 75 hp Mathis 4GO engine. This fixed landing gear presented substantial drag to the airplane and the designers changed to a conventional tractor gear with a tail wheel, the substitution of a tiny tail wheel for the large nose wheel reducing the drag. This change resulted in the airplane being designated the S.O. 7055, although everything else remained unchanged.

The 75 horsepower engine proved inadequate for the desired performance, and the designers substituted a Walter *Minor* 4-III engine developing 105 horsepower at 2500 rpm at sea level. While the Mathis engine is a French product (and therefore highly desirable as part of an export airplane), the Walter engine is the famous Czechoslovakian product that gained an international reputation in European aircraft prior to World War II. It will be no surprise that the Walter company is also nationalized in Czechoslovakia as part of the National Corporation of Czechoslovakian metal and engineering industry. A four-cylinder inverted, air-cooled direct-drive engine, it has a displacement of 244 cu. in. and weighs just 200 lb.

The greatest difficulty European lightplane designers have had since World War II is in obtaining really good small engines and propellers. The reason for this difficulty is quite obvious: because there is no quantity market for such products no intensive development work is worthwhile. Therefore, U. S. lightplane engines and propellers are highly prized abroad and the S.O. 7060, as the Walter-powered version is designated, is being further modified to the S.O. 7065 (also known as S.O. 7060/65) by the substitution of a Continental engine, and is being offered with either the C115 (115 hp) or the C125 (125 hp) for the export trade.

The *Deauville* is all-metal, unusual in an airplane of its small size, and features thoroughly modern construction. The fuselage is fabricated in two halves and joined together along the vertical centerline. With an eye on production, the designers use the same all-metal surfaces for the fin, and for left or right stabilizer, these being completely interchangeable. The wing is also designed for simplicity of production with a constant chord and thickness. In this arrangement all of the ribs from root to tip are identical, greatly reducing tooling and production costs. Longitudinal stiffening is on the exterior of the wing, which also reduces rib fabrication costs by eliminating expensive cutouts for internal stiffening.

A very modern feature is the sliding canopy for the cockpit, modern in fighter design but a practice abandoned long ago in U. S. lightplane design in favor of the standard cabin door. Nominally a two-seat side-by-side design, a third passenger can be squeezed into the *Deauville* behind the pilot and passenger in front.

The *Deauville* has a span of 34 ft., is 21 ft. 11 in. long and stands 7 ft. 11 in. high, making it just the size of the Bellanca *Cruisair* or the Aeronca *Champion*. It has an empty weight of 1140 lb. and a gross weight of 1760 lb. With this useful load of only 620 lb. it can be seen that three big 200-pounders squeezed into that cockpit wouldn't be able to fly very far, since there would only be room for about three gallons of gas. With only two aboard, however, the *Deauville* has a standard range of 270 miles and with only a pilot it can cruise for 4-500 miles.

It has a top speed of 122 mph and cruises at 110 mph, which is mighty good for 105 hp airplane. With the bigger Continental installed, this cruise will be upped to something like 125 mph, making it a really fast airplane of its type. It can operate at 15,000 ft. and gets up to 16,400 ft., plenty high for a lightplane.

The French have high hopes for their *Deauville* in the export market but a tentative price tag of $6000 makes it a little steep in this country, where that amount buys two Aeronca *Champions!* All of which probably explains why just one airplane of each type has been built, beginning back with the 7050 and proceeding through the 7055, 7060 and the new 7065. The plans were to build at least two but the second one isn't flying yet. Racy in line, a good performer and a tribute to French lightplane design, the *Deauville* isn't a serious threat to Mr. Piper or to Aeronca, who will probably start thinking up some fancy designation letters if they ever hear the S.N.C.A.S.O. 7060 is selling like hot cakes!

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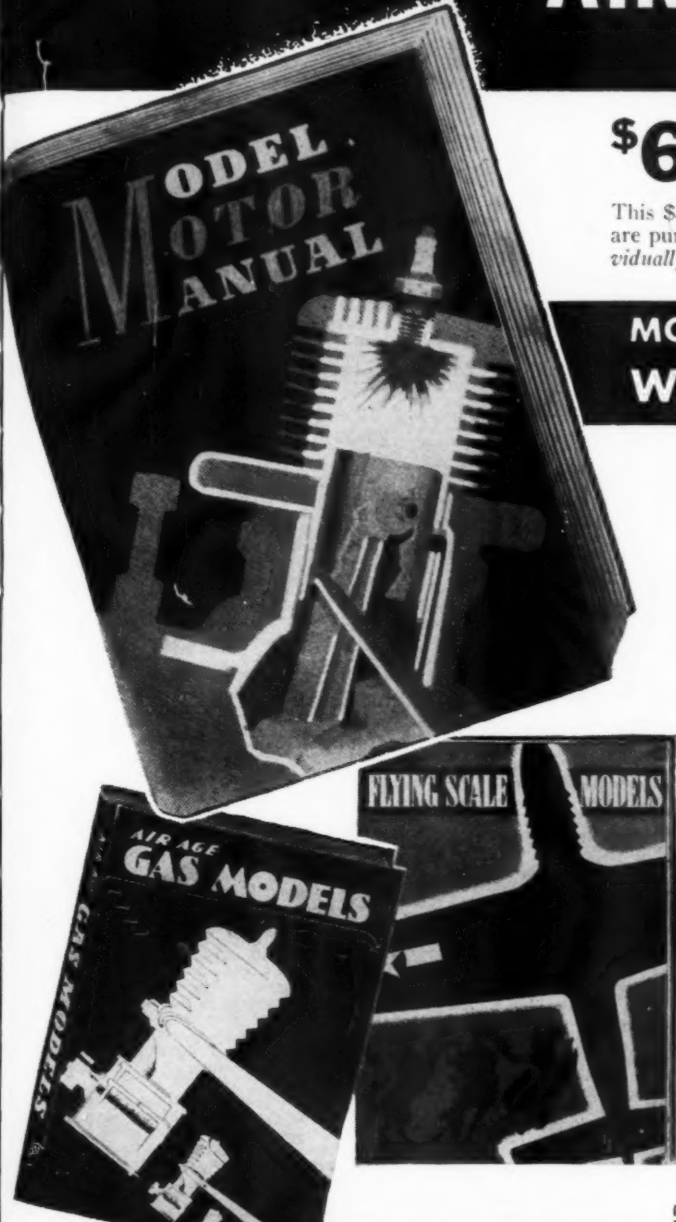

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FLASH

(*Continued from page 7*)

second, enabling the plane to deliver a broadside of three-quarter tons of rockets in just 6½ seconds! One of the problems still to be overcome is the terrific blast from the rear of the rocket, which is passed through a stainless-steel duct out the bottom of the wing. Now, you can always tell when a plane is carrying rockets because you can't miss them hanging under the wing. But with this new internal mounting system, it may not be long when rocket-bearing airplanes will be virtually secret weapons, since they will look just like any other!

THE AIR FORCE revealed recently that they plan to remove two of the engines from a Boeing B-47 *Stratojet* bomber and fly it as merely a four-jet airplane. What they didn't explain in this switch was that the six General Electric J-47 turbojet engines of the standard B-47A producing a total of 20,800 lb. of thrust are being replaced by four Allison J-35 engines producing a total of 38,800 lb. of thrust—almost double! This is what can be accomplished by the engine manufacturers' constant efforts to produce more and more powerful packages, i.e., greater power from the same size engine. It means that the not inconsiderable drag of the two extra nacelles can be dispensed with but the high-speed characteristics of the airplane will be improved by removing these concentrated weights near the wing tips, where they bend and twist the wing. In addition, it will take only two of these engines to fly the airplane at a high cruising speed, instead of four of the former engines, which means increased range. And if you think the job of taking out one engine and putting in a new one is simple, you'll be surprised to learn that the Air Force will pay Boeing $4,122,427 for the job!

SOMETIMES IT takes an awful long time to develop an idea to the production stage but we think something of a record has been set with the Air Force's new auto-

matic parachute. The new 'chute contains an aneroid barometer (indicating atmospheric pressure) and a timer device. The chute is set to operate when the barometer indication corresponds to, say, 10,000 ft. The pilot is jettisoned from his cockpit at, let's suppose, 40,000 ft. and he hasn't anything to worry about! When he reaches 10,000 ft. the parachute automatically opens. Idea is to get him down quickly by falling freely from the high altitude where there is insufficient oxygen for breathing purposes for more than a few seconds. Actually he doesn't attain supersonic speed in that long drop, since his "drag coefficient" (depending on the individual!) holds his speed to 200-250 mph. Materiel Division at Wright Field has finally declared the device satisfactory for service use and it is being issued as standard equipment. The idea originally dates back to 1925 at McCook Field, only a few miles from today's Wright-Patterson AFB, Dayton, Ohio!

EVER WONDER what happens when a bullet goes through the combustion cylinder or the turbine of a turbojet fighter? The Air Force has worried about it plenty and even ran some tests at Wright Field on a P-80 installed in the wind tunnel, revved up to full speed. A rifle was fired directly at the turbine—while all hands stood safely outside! Well, the answer seems to be—nothing! Lockheed F-80C fighters in Korea have suffered rifle hits both in the burner, the tailpipe and right through the turbine—but they all got home safely. The hit through the burner resulted in the flame inside leaking to the airplane skin, which was burned and blackened but not seriously hurt. The shot through the tailpipe did about the same thing: blackened the airplane skin. Another F-80 pilot lost four blades from his turbine (which turns at a "mere" 11,750 revolutions per minute!) when a Korean shell passed through, but he taxied up on the strip after landing as if nothing had happened, and didn't even know about it until he was told! The engineers are thoroughly baffled by this one, since the slightest change in balance of that wheel has been known to cause it to disintegrate; Lockheed test pilot Tony LeVier lost only one blade in an F-80 turbine and the resulting disintegration of the turbine neatly sliced the tail off his airplane over Southern California! Now engineers don't know what to think, except that the F-80 is a whale of a rugged airplane in Korea!

YOU HAVE PROBABLY read plenty about "shy and retiring" personalities in the aviation business but a new story on S. J. "Steve" Wittman just about takes the cake. (His first name is Sylvester—that's why they call him "Steve"—wouldn't you?) Way back in 1938 he built one of the neatest little two-seat high-wing monoplanes you've ever seen—just for his own amusement! But it wasn't until just the other day that the news came to light and pictures were published of it. For 12 *years* Steve has been flying around in the ship, powered by a Continental 85 hp engine and employing his patented flexible landing gear, yet he's never bothered to either reveal or conceal the fact. Using his own scimitar-shaped wooden propeller, the *Buttercup* has a top speed of 150 mph and cruises at 130 mph—on just 85 hp! But the best is yet to come: it lands at just 30 mph! If you'll think back for a moment on all of the page ads and big ballahoo campaigns put on announcing a raft of new personal airplanes—that never made the grade—and then think of this Wittman guy's turning out a terrific airplane and merely hopping around in it for his own amusement, you'll see what we mean by "shy and retiring." Steve has just completed a new four-place airplane, also for his own amusement, but we'll bet he can't keep this one quiet for 12 years!

SOMETIMES AIRPLANES turn out as plain ole "hard luck" babies and nothing much can be done about them. If they had trouble due to some particular design fault, the engineering department could fix them right up but when it's just pure bad luck, it gives the airplane a bad name that frustrates the engineers and executives alike. The North American AJ-1 Navy composite-powered attack plane is a recent example. Designed to carry the atom bomb from a carrier deck (and then Louis Johnson snatched the carrier—the 65,000-ton *United States* out from under it), the AJ is powered by two Pratt & Whitney R-2800 *Double Wasp* reciprocating engines and a J35 turbojet in the tail. The first XAJ-1 dove into the sea off the California coast early in 1949 killing the two test pilots. Last June the second AJ crashed near Bedford, Va. on a cross-country delivery flight from Inglewood, Calif. to Patuxent Naval Air Technical Center, Md., killing its flight crew and several technical representatives. Then, on Aug. 7, the third AJ was lost on a test flight from Edwards AFB, Muroc, Calif. when its right reciprocating engine tore out of its mount at 25,000 ft. and knocked off the tail. On this third disaster, the two test pilots bailed out in time to save their lives, the first crew to be saved. North American and Navy investigators have examined every scrap of metal and gone over the entire list of possible causes but the only answer so far is bad luck—or sabotage!

A LOT OF GOOD stories come to light long after they can be classified as news but sometimes they make mighty interesting reading. As, for example, the first flight test of the Boeing XB-47 *Stratojet* bomber on Dec. 17, 1947. After studying, planning and preparing for many, many months, Boeing test pilots Robert Robbins and Scott Osler finally climbed aboard the radical new airplane for that fateful first takeoff—a time no pilot is anything but a bag of nerves. They taxied to the head of the runway, breathed a silent prayer and shoved the throttles forward for the biggest adventure of their lives. Halfway down the runway the red light indicating a fire in No. 2 engine suddenly flashed on! (What would you have done?) They braked the airplane to a stop with a scream and taxied back where it was de-

termined it was only a false alarm. Then they shoved the throttles forward, hurtled down the runway. Robbins fingers on the switch for the 18 JATO bottles in case they were needed, and the fire warning light flashed on again! (*Now* what would you have done?) Robbins, in a flash, made his decision and lifted the huge new bomber smoothly into the air and on its way to Moses Lake Air Force Base 145 miles away. He had simply ignored the warning the second time—which makes you sweat just to read about! That is test pilot coolness if we ever heard of it!

WE HAVE mentioned in these pages before that the Northrop Flying Wing seemed doomed and we can now put the official *finis* on the program with word that the remaining *Flying Wing* bombers have been quietly cut up with a torch and the remains sold as scrap metal! Thus ends one of the most adventurous but most debated episodes in aviation. John K. Northrop proved, by actual test, that a true "all-wing" airplane is not only practical but is a substantial advance over conventional arrangements. But the Air Force obviously feels otherwise and the final chapter on a brilliant episode in Aviation history is now closed.

SINCE THE EARLY 'thirties, the government has insisted that scheduled air lines use multi-engined transport airplanes, supposedly for safety's sake (they are still required for overseas operations—and four engines at that!). And so it was with considerable trepidation that the Civil Aeronautics Board gave tentative, temporary approval to the operation of single-engine feeder air lines in the Midwest. Well, the first record is in and Central Airlines has completed its one millionth mile of scheduled passenger transportation without incident! The air line operates 11 Beech *Bonanza* single-engine four-place personal aircraft and has carried 3,323 passengers and 152,193 lbs. of mail on 3,063 flights in its first eight months of operation. But the Board still isn't satisfied and it may take many more millions of miles of such safe operation before official sanction is given on a permanent basis. (Meanwhile, the big air lines complain that most of their losses are incurred by being required to make stops at small, unprofitable towns—which are just the sort of stops needed for successful feeder operations!)

Spitzy

(*Continued from page* 35)

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